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Paul Lucas looks at the camouflage and markings of the Canberra B.2, B.6, B(1).6, B.15 and B.16 in frontline RAF service, with illustrations by **Peter Scott**

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Tempus Fugit

I don't know whether it's just me getting older, but time doesn't half seem to fly by nowadays... Days of the week seem to shoot by in a blur. Starting the normal working week on a Monday, in the blinking of an eye it's POETS day – (Poddle Off Early Tomorrow's Saturday) – and I still haven't done half of what I had planned to do!

Obviously the magazine editing work comes first, but even so, I always seem to be the last in SAM Publications' trio of editors that gets his copy in to the guys in the Studio. They're very kind to me though, pat me on the head paternally, and diplomatically suggest that I might try to get everything in a little sooner next time...

To be fair some of the articles we run in 'MAM' are from contributors whose first language isn't English – (they're the ones from Yorkshire... *only joking!*) – and bless 'em, it does sometimes take a little longer to decipher what they might be wanting to say. Modern computer programme foreign language translating systems are good, but sometimes might not give the correct word that was meant... *But hey, my Serbo Croat is a bit 'rusty' too.* However, I would rather spend a bit more time 'translating' an interesting article than not have it printed at all.

When I'm not 'out and about' at model shows or air displays, I tend to try and get some 'additional' modelling in at weekends... assuming I've not been 'taken out shopping' by the *memsahib*, or I'm not chasing another looming deadline.

However, my modelling aspirations always exceed my ability to finish what I want and I continually make overambitious plans to build models – usually for specific events or anniversaries – but before I know it, not only has the specific event or anniversary been and gone, but I haven't even started on the blessed model, or more usually *models*, in the plural!

I think that's my problem, I like to build more than one model at a time. I love 'theme building', but that usually means that more than one aircraft type, often from different or opposing sides, 'needs' to be built. Okay, they don't 'need' to be built, *but I would like to build them...*

The other problem is that I am a relatively slow modeller too, which doesn't help.

A modelling friend I know uses superglue to assemble his models. He can have a full airframe together and ready for painting whilst I'm still assembling the cockpit!

As I've often mentioned, I'm not a 'super-detailer' modeller, (it's been said that I'm not 'a modeller' at all but 'an assembler of kits' which I



Reader John Harrison sent in these superb Classic Aircraft Photography photos of Spitfire Mk IX, PV270, recently restored in New Zealand, and finished in the markings of Wing Commander Al Dere circa mid-1942. Can anyone spot the 'slight error' in the camouflage pattern in the upper surface photo below...?

thought was a bit scathing, albeit true!), but even I wouldn't now contemplate putting a cockpit interior together without a minimum of photo-etch seat belts, and most of my 'basically-from-the-box-models' have various bits and pieces from the myriad of aftermarket companies to enhance them.

In fact, to be honest, I can't remember the last time I actually built a model literally 'straight-from-the-box', and I don't know whether I would be

don't need such *cissy* accoutrements to produce their masterpieces. *Personally I am of the brigade that needs every little help I can get!*

Whilst I've never dared to spray Johnsons 'Klear/Future' (or whatever it is called where you live), through my airbrush for fear of it drying inside and clogging it, I acknowledge that many, many modellers successfully use this erstwhile domestic floor wax/polish, which quickly dries to a glossy sheen ready for decal application.

"I can't remember the last time I actually built a model literally 'straight-from-the-box'..."

able to. Although reading some of the reviews in our sister magazine, 'Scale Aviation Modeller', some of the latest, state-of-the-art kits, from the likes of Eduard, Tamiya, Dragon and Hasegawa, especially in the larger scales such as 1/32, really don't need any aftermarket products to enhance them

In fact I've been pondering moving up a scale – at some stage in the future perhaps? I generally model in 1/48 scale, but I have been 'laying down' a few selected 1/32 scale kits, (*like good wines*), for my retirement... although the way things are going I don't think I'll be retiring until I'm about 90 years old, assuming I make it to then!

Our chosen hobby is continually evolving and introducing new technologies all the time – many from other walks of life.

The airbrush, once the preserve of commercial artists and photo enhancers, is now almost *de rigueur* for the 'perfect paint finish' although some master modellers, like my old friend Tony O'Toole,

However, I have readily adopted the use of automobile acrylic primer, from my local Halfords auto DIY store, and never finish a model without spraying a thin coat of this 'wonder paint' on first!

And as for washes, I am now a confirmed disciple of the Pro Modellers Weathering Washes... *how's that for progress?*

Despite all these time-saving devices, I STILL can't seem to finish as many models as I plan to... *tempus fugit as they say, or words to that effect!*

Next month you'll be pleased to learn that you're getting some well-earned relief from

my inane ramblings and regular reader Clive Hobden is providing a Guest Editorial... *with thoughts of the forthcoming summer holiday season in mind...*

Neil Robinson
Group Editor
Model Aircraft Monthly



In this issue: 'Airfile', the colour schemes and markings supplement. Sponsored by



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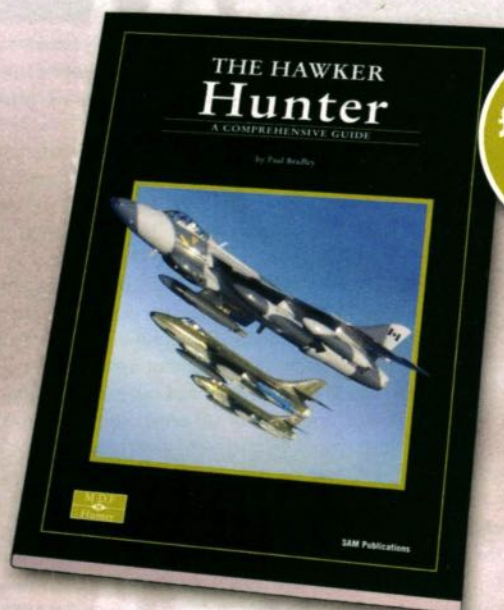
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P-40E Kittyhawks of the 7th IAP of the Black Sea Fleet Air Force at their base airfield.

Soviet P-40s

Vladimir Kotelnikov describes the use of Curtiss P-40 fighters in Soviet Air Force service during World War Two

American fighters of P-40 family, (known in the Soviet Union under their British designations as Tomahawks and Kittyhawks), were the third largest imported fighters stock in the Soviet Air Force during the World War Two, after Airacobras and Hurricanes, and it is worth mentioning that they were the first American aircraft shipped to the USSR under the Allies' Military Assistance Programme.

As soon as Germany invaded the USSR and the British Prime Minister Winston Churchill voiced his readiness to provide military assistance, the issue of selecting the preferred aircraft types to be imported into the Soviet Union emerged.

On 18 July 1941, the Soviet Ambassador filed the relevant request with the British Government. Two days later, the British Ministry of Aviation decided to allocate 200 Tomahawks for that purpose, including those already in the UK and those still in the queue to be shipped from America. British government internal documents give the motivation for the choice as being, '...fighters of this type were no longer in use by the RAF in

Europe, were being phased out in the Middle-East Theatre, and were of US origin, therefore, the British would be spared of any responsibility for their quality and availability of spare parts'. On 25 July 1941, Churchill informed Stalin about the decision in an official letter.

A day earlier, the US Undersecretary of State had notified the Soviet Ambassador Umanskiy about the US intent to offer, "at least, a squadron of P-40s". In documents delivered to Moscow by the US President's representative A. Harriman, a more specific figure was given: 900 fighters by July of 1942, and General Arnold, the US Air Force Chief of Staff, suggested that those would be mostly P-40s, the only American land-based fighter in mass production at that time.

On 1 September 1941, an Allied convoy delivered the first cargo of forty-eight Hurricane and Tomahawk fighters from England to the sea port of Arkhangelsk. The assembly of the fighters began at the so-called '10 Kilometre', wood-covered airfield, which had been built by prisoners in the vicinity of Arkhangelsk.



P-40B Tomahawk amongst the other foreign aircraft exhibited at the hall of New Equipment Bureau of the Central Aero-Hydrodynamic Research Institute

British mechanics and engineers were sent to Russia to assist in the assembly of the aircraft. Previously, at the end of June 1941, a Lieutenant Alison, a specialist in P-40s, and pilot-instructor Hubert Zemke had arrived from the USA. The P-40s proved to be relatively easy to transition to, and took just a few hours for Major N I Khromov, the Soviet Military Acceptor, to master and make the first flight including a range of aerobatic manoeuvres.

In the second half of September, the Air Force Research Institute (NII VVS) pilots ferried six Tomahawks from Arkhangelsk to the 27th Reserve Regiment, based at the airfield in Kadnikov, 50 km north-east of Vologda. The site was planned to be used for training the pilots and ground personnel. The aircraft assembly was relocated from Arkhangelsk to Sokol settlement, 15 km away from Kadnikov. The assembly workshops were headed by engineer Chasovikov, with the assistance of four British specialists. The fighters were delivered to the site, packed in crates, by railway.

By the end of September 1941, the 27th Reserve Air Regiment (ZAP – Zapasnoy Aviapolk) pilots received their first combat mission – to escort the transport aircraft with the Allied delegation which was flying to Moscow for participation in a conference.



Refuelling a Tomahawk of the Eastern Operative Group, which provided air cover over the 'Road of Life' supply way, running along the iced Lake Ladoga to the besieged Leningrad in winter 1941-42. Note the painted-out roundel under the port wing

The escort comprised three Tomahawks led by the Regiment Commander, Major Belozеров. The mission to the Soviet capital was successful; however, on the way back, when taking off from Chkalovskaya airfield near Moscow, Belozеров's fighter crashed due to engine failure, killing the pilot. It was the first P-40 lost by the Soviet Air Force.

The conference, attended by British and American delegates, was dedicated to the issues of military assistance to the USSR. The scope of supplies and types of military equipment to be delivered were negotiated in detail. In recommendations prepared by the General Staff Intelligence Department and Air Force Chief Directorate, the P-40 was amongst the preferred imported aircraft types, with one reservation, however – earlier versions preceding the P-40E were considered outdated. However, the situation was critical. The Soviet Air Force was suffering heavy losses and thus would accept just any battle-ready combat equipment.

Cash and carry...

Initial shipments from the USA were arranged on a 'cash-and-carry' basis. The purchases were paid for with furs, gold and platinum. At first, only fighter aircraft were imported. By 23 September 1941, sixty-eight P-40s, (of the earlier B and C export versions), had been purchased. Their shipping began early in October. By the end of November, a further thirty-nine fighters had left American ports, including the batch of P-40s that had been prepared for shipment since early July.

Twenty P-40B/Cs/Tomahawk Mk IIs and one P-40G, (a modified P-40C with the P-40E wing and



Representatives of the Air Force command and local authorities in front of A S Khlobystov's P-40E, (who later became a Hero of the Soviet Union), of the 20th GvIAP. This pilot made two ramming attacks on the same day of 8 April 1942, flying a P-40B/C Tomahawk. Khlobystov is in the cockpit

additional machine guns), arrived. By the end of December, another lot of seventy-six fighters was shipped from the USA.

By the end of 1941, a total of some 230 Tomahawks had passed Soviet Military Acceptance, including twenty-three Tomahawk IIA versions, while the others were mostly Tomahawk Mk IIB types. Some of the original Tomahawk Mk I fighters, which had been manufactured under a French order, also found their way to the Soviet Union via the UK.



Tomahawks of the 126th IAP taking off

"British mechanics and engineers were sent to Russia to assist in the assembly of the aircraft..."

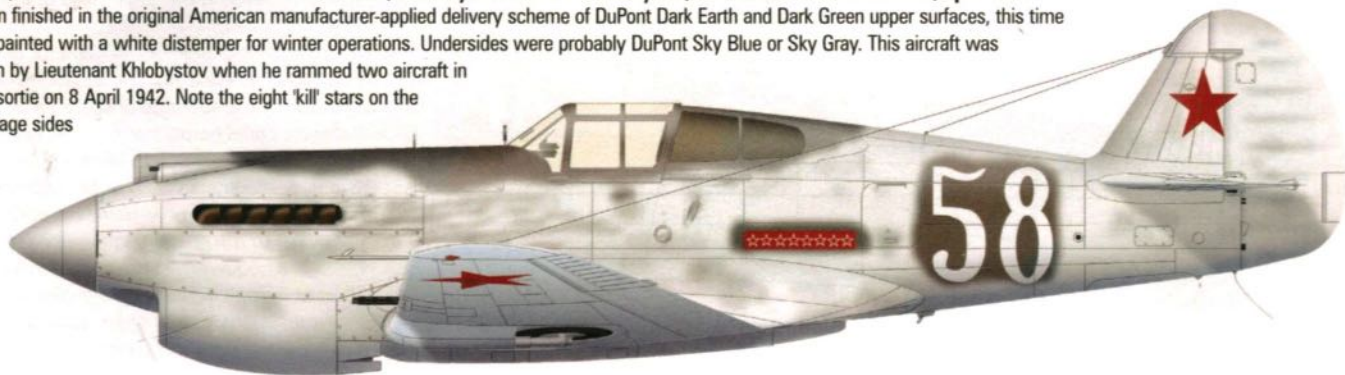
P-40B/Tomahawk Mk IIB, (AN281) 'white 24' of the 154th IAP of the Baltic Fleet Air Force, Leningrad, 1942

Still retaining its RAF serial number, 'white 24' was finished in the original American manufacturer-applied delivery scheme of DuPont Dark Earth and Dark Green upper surfaces with Sky Grey undersides. Note the overpainted RAF roundel and fin flash and the yellow-outlined VVS star on the fuselage



P-40B/Tomahawk Mk IIB 'white 58' of the 20th GvIAP, flown by Lieutenant A S Khlobystov, Murmansk-Murmashi airfield, April 1942

Again finished in the original American manufacturer-applied delivery scheme of DuPont Dark Earth and Dark Green upper surfaces, this time overpainted with a white distemper for winter operations. Undersides were probably DuPont Sky Blue or Sky Gray. This aircraft was flown by Lieutenant Khlobystov when he rammed two aircraft in one sortie on 8 April 1942. Note the eight 'kill' stars on the fuselage sides



It was a Tomahawk Mk I of the first British shipment that was inspected by NII VVS specialists on 25 September 1941. After that, it was subjected to state tests. In particular, mock combats were carried out between the Tomahawk and a German twin-engined Bf 110 fighter. The outcome hardly satisfied the Air Force commanders.

The Tomahawk's maximum speed of 545 km/h proved to be lower than that demonstrated by Soviet Yak-1, LaGG-3 and MiG-3 fighters. The Yak-1 demonstrated a better climb rate, and the MiG-3 had a higher ceiling than the American counterpart. Without cannon armament, the Tomahawk pilots could not attack enemy aircraft from long distances. At the same time, the fighter's salvo rate of fire per second was fairly impressive – almost twice that of the MiG-3 version with three machine guns. The backrest armour plate only protected the pilot from rifle bullet calibre fire, whilst the on-board oxygen equipment was found to be outdated.



Early delivery Tomahawk, (possibly AN979?), during testing at NII VVS, circa October 1941. Note the red star on a white disc under the starboard wing

The Tomahawk's advantages reported by the experts included the fighter's excellent take-off and landing characteristics, satisfactory manoeuvrability in the horizontal plane and significant, (according to Soviet standards), operating range and flight duration. The pilot's canopy was well transparent, and its sliding section could be locked in any intermediate position and could be jettisoned in case of emergency.

NII VVS specialists recommended to use the Tomahawk in Air Defence Forces, for bomber escort, as well as a light ground-attack aircraft against infantry at the battlefield.

Operational

In compliance with the NII VVS recommendations, the first Tomahawks were received by Air Defence Regiments. The first one to master the aircraft was the 126th IAP, which started combat operations on 12 October 1941. The Regiment operated at the Western and Kalinin Fronts and was actively involved in the defence of Moscow. Within a month – by 15 November 1941 – the Regiment's



Tomahawk crash-landed on the Kola Peninsula, 1942



Tomahawk, (possibly AN979 again?), during testing at NII VVS, circa October 1941. Note the original RAF Sky fuselage band and painted-out RAF fuselage roundel and fin flash

pilots had carried out 685 combat missions and claimed seventeen enemy aircraft shot down. Senior Lieutenant S G Ridnyi was awarded the Hero of the Soviet Union title for his successes whilst flying the Tomahawk.

Later in November, the 154th IAP began combat operations with the Tomahawk, on the Leningrad Front. The Regiment received twenty unassembled fighters on 28 October, and the first combat flight was performed on 26 November. The 159th IAP arrived on this front in December, followed by the 196th IAP in January 1942. All these Regiments were included into the Eastern Operative Group, which was provisioning air cover to the transport aircraft delivering various supplies to besieged Leningrad via Ladoga Lake.

The Luftwaffe made repeated attempts to break down the Soviet 'air bridge', and the Tomahawks did their bit to parry the German attacks. For instance, on 17 December 1941, pilot P A Pokryshev of the 154th IAP, while covering transports jointly with five other P-40s, was engaged in a dogfight with nine Messerschmitt 109 fighters. At the same time Squadron Commander Pilyutov escorted nine clumsy PS-84 transports on his own. He fought with six German fighters, and shot down two of them before going down himself.

In the Navy, the North Fleet was the first to be equipped with Tomahawks. Twenty Mk IIB fighters were allotted to the 2nd Guards Composite Air Regiment (GvSAP) based at Vaenga airfield.

Whilst preferring Tomahawks to Hurricanes, Soviet pilots were unanimous in their opinion that this American type failed to match modern fighters, either Soviet or German, in many aspects. The 27th ZAP (Reserve Air Regiment) instructor pilot V M Petrov, (who later became a famous arctic pilot), wrote about the Tomahawk in his memoirs, "American aircraft... proved to be awfully clumsy and heavy..."

From the maintenance standpoint, Tomahawks also caused many problems to Soviet technicians. Power generators tended to fail and had to be replaced with the Soviet-made GS-650 equivalents. This defect had been revealed back in the USA during the aircraft's testing, so the Americans were not at all surprised by the Soviet request for 300 spare generators in January of 1942.

Allison V-1710 powerplants also caused many problems. For instance, their liner bearings included inserts made of so-called white alloy, (lead/silver plus a cadmium additive). These bearings demonstrated better performance at higher rpm and heavy loads, however, they were extremely sensitive to oil quality and purity and required thorough adjustment during installation. In addition, the Allison powerplant had a number of short-period accelerated modes, which had to be used sparingly and with maximum care and



Tomahawks of the 126th IAP in white upper surface winter camouflage scheme, winter 1941-42. Note the red star under the starboard wing on a crudely painted white disc

skill, otherwise, it would result in overheated oil, melted and seized bearings, and broken-off piston-rods. All the above frequently led to accidents. The engine oil system defects sometimes resulted in in-flight fires, such as the one that occurred with the 964th IAP pilot, Hero of the Soviet Union P Kharitonov.

Initially, the V-1710 engines operated for only 35 to 40% of their service life. The situation was also worsened by the shortage of spare parts.

Tomahawks could hardly stand the Russian winter, to which they seemed to be completely non-adaptable. The engine was started with the help of the electric starter only. However, at -5°C the starter failed to run up the engine, while at -12°C, which is a frequent weather condition for the central part of European Russia, the engine cooling liquid froze. Such freezing often resulted in rupture of the oil cooler cells, (including several in-flight failures).

The 154th IAP reported, "On the night of 4th/5th December 1941, (at -26°C), nine oil coolers ruptured notwithstanding the fact that the engines were warmed up every 1.5 to 2 hours". In such cold, the wheel tyres failed and burst, and liquid thickening in the hydraulic system resulted in landing gear extension failures. Technicians tried a variety of approaches to resolve the problems. For instance, the oil was drained off before frosty nights through custom-made dump cocks and imported hydraulic liquid, and Preston anti-freeze solutions were replaced with the Soviet frost-proof types.

From first off, the Tomahawks were short of ammunition for their machine guns, including a complete lack of incendiary and tracer bullets. On 20 November 1941, the Air Force Chief Directorate applied to the People's Commissariat of Aviation Industry, (NKAP), with a request to try rearmament of the American fighters with Soviet BS (12.7mm) and ShKAS (7.62mm) machine guns.



Junior Lieutenant M E Bychkov of the 20th GvIAP standing in front of his P-40 with its fifteen 'kill' markings

"In November 1941, the 154th IAP began combat operations with the Tomahawk..."

Two options were considered: four ShKAS 7.62mm machine guns installed in the fighter's wing with two BS 12.7mm machine guns in the fuselage; or just the replacement of wing-mounted machine guns.

The first option proved to be too complicated. The BS 12.7mm machine guns would require a new mounting, a more powerful synchronization unit, new ammunition boxes to accommodate the longer cartridges, and the breech block shifting unit operating with compressed air. Moreover, the Berezin BS machine gun was a single-side feed, which would result



Refuelling of a Kittyhawk at the 3rd Reserve Air Brigade

in a single-gun layout instead of the existing two Colt machine guns. In the case of a standard installation, the BS would eject empty cartridge cases sideways with the risk of damaging the horizontal stabiliser's leading edge. In order to install the BS with the cartridge belt receiver turned upwards, the engine cowl panels would need to be modified with an arrangement of additional fairings.

The replacement of the wing-mounted guns would require less effort. This modification would only require the changing of the gun mountings and ammunition boxes, (with the narrower ones), cutting new hatches and the installation of an electric trigger.

Considerations about the Tomahawk's rearmament options continued until early in 1942 when the idea was finally dropped. However, some of the American fighters were equipped with RS-82 rocket projectiles for ground-attack purposes – four rocket carriers being mounted under each wing.

Continuing problems

During the early part of the Great Patriotic War, the Red Army continuously retreated and aviation units had to move back inland. Whilst withdrawing from one airfield to another, the ground

personnel could not prepare each new landing area properly. The situation was aggravated as the winter drew on.

Take-offs from fields covered in snow required the snow flattening, and the ground support units were short of suitable equipment to do it. At that point, the Soviet Air Force was forced to return to the use of ski landing gear. The idea to equip Tomahawks with skis, however, failed due to the formidable scope of airframe and landing gear modifications it would require.

By the spring of 1942, many P-40s had been grounded due to the lack of engine spares. In this connection, the Commander of the 154th IAP A A Matveev and Engineer Colonel P Malikov initiated a project for Tomahawk modification for the use of Soviet M-105P and M-105R engines.

For the installation of new powerplants, components and units found in stock at the evacuated Factory No 23 in Leningrad where LaGG-3 fighters



Soviet pilots of the 3rd Reserve Air Brigade familiarise themselves with the P-40E-1

had been manufactured were used. The M-105 engine was lighter and smaller than the Allison engine and would easily fit under the P-40's original cowl. The Soviet-made engine was mounted slightly higher than the American one. The spinner of the VISH-61 propeller was smaller in diameter, so an adapter ring was installed. The ring had holes around its diameter for the air supply to the supercharger. The LaGG-3's exhaust system was adapted without modifications. A number of such hybrid machines were produced at the 1st Aircraft Repair Base and allotted to the 196th IAP at the Leningrad Front.

For the purpose of pilot conversion training, several custom-made, two-seat versions were built with the second (and rather cramped) cabin arranged in the fuselage upper fairing.

Meanwhile, in early 1942, Tomahawks continued to arrive in the USSR, although in much fewer



A Soviet pilot on the wing of a P-40K during the Alaska-Siberian (ALSIB) ferry route, autumn 1942. Note the drop tank

P-40E 'red 20' of the 196th IAP, Leningrad Front, summer 1942

One of several modified P-40Es retrofitted with Klimov M-105P engines and VISH-61P propellers. This aircraft was finished in white upper surfaces, (presumably over the original delivery Dark Earth/Dark Green), with Sky Gray/Neutral Gray(?) undersides. Note the LaGG-3-style exhaust manifolds



P-40E 'White 10' of the 2nd GvIAP, flown by the unit CO Lt Col Boris Safonov, Vayenga, North Fleet, May 1942

The original delivery manufacturer-applied Dark Earth and Dark Green, (or Olive Drab), upper surfaces appear to have been overpainted in a blue shade. Undersides were in a light grey. Note the white spinner. This aircraft was shot down whilst being flown by Lt Col Safonov on 30 May 1942



P-40E 'white 65' of the 154th IAP, flown by the unit CO Lieutenant Colonel A A Matveev, summer 1942

Finished in what appears to be manufacturer-applied Dark Earth and Dark Green upper surfaces with Sky Gray/Neutral Gray (?) undersides. Note the fifteen 'kill' stars (in red and yellow) on the fuselage sides and the white spinner



P-40K-1-CU 'white 01' of the 7th IAP of the Black Sea Fleet Air Force, Sokologoroe airfield, April-May 1944

Finished in what appears to be original manufacturer-applied Dark Earth and Dark Green upper surfaces with Sky Gray/Neutral Gray (?) undersides. Note the white rudder and spinner, and the sharkmouth on the nose



P-40K-1-CU 'red 26' of the 191st IAP, flown by N Shevchenko, Leningrad Front, winter 1942-43

Finished in what appears to be Dark Earth and Dark Green upper surfaces overpainted in white distemper which is wearing off. Sky Grey/Neutral Gray (?) undersides. Note the inscription 'For the Motherland' on the fuselage side



numbers – a total of just seventeen was delivered. However, previously delivered aircraft sufficed to replenish the needs of both the front-line Air defence Regiments and newly formed fighter units. In January, several Tomahawks were transferred to the 20th GvIAP, and a few weeks later the entire 964th IAP was equipped with the type. However, by 1943, all Tomahawks had been withdrawn from front-line units, and their use was restricted to operations in the rear. Some twenty-seven Tomahawks eventually survived the war still on active service in Air defence forces.

Kittyhawks

Whilst Tomahawks were struggling to fight the Russian winter, let alone the Luftwaffe, the US factories had already begun to manufacture the new



Hero of the Soviet Union, Major A Kovalenko – commander of the 2nd GvSAP of the North Fleet Air Force, 1942 in front of his P-40

generation P-40 fighter – the Hawk 87, a version of the P-40 that was equipped with the improved V-1710-39 powerplant, replacing the earlier V-1710-33 version.

The new engine demonstrated better altitude performance and allowed for rapid acceleration in so-called 'emergency combat mode'. At the same



P-40EF two-seat reconnaissance conversion

ufacture, but would inevitably result in the same shortcomings inherent in its predecessor.

The first Kittyhawks to arrive in the Soviet Union from England were fourteen fighters that had been delivered to the Arkhangelsk port at the end of 1941. All early shipments arrived via sea-ports in the north of Russia.

Their first missions were also completed at northern sectors of the Soviet-German front line. At first, Kittyhawks were delivered to the Regiments that had already mastered the Tomahawk, ie the 126th and 154th IAPs.

By the end of February 1942, the latter had at its disposal almost as many P-40Es as the earlier series Tomahawks. As more Kittyhawks arrived they were used to re-equip other Air Force units. During the spring, these fighters were delivered to a number of squadrons of the 19th and 20th GvIAPs, belonging to the 258th Combined Air Division (SAD). The Division operated at the Karelian Front. The 2nd squadron of the 19th

The ALSIB route

In the summer of 1942, Kittyhawks began to be ferried via Iran, and in autumn, via Alaska and Siberia, (the ALSIB route). On 11 September 1942, US Lieutenant Andersson led a group of twenty-two P-40Ks to Ladd Field, Alaska, via Canada. A month later, on 11 October, Soviet ferry pilots, commanded by Captain Finogenov, took off to ferry the fighters further westwards. An A-20B bomber led the fighters to Uelkal where they landed on the next day.



Kittyhawks of the 154th IAP on the Leningrad Front, summer 1942

"In the autumn of 1942, Kittyhawks began to be ferried via Alaska and Siberia – the ALSIB route..."

time, the designers had completely reworked the fighter's fuselage. It was reshaped to improve the field of vision from the cockpit, with the engine moved upward. The landing gear legs were shortened whilst the machine guns were entirely removed from the engine cowlings – all the armament being placed in the aircraft's wings. Such a change in the layout allowed for easy and fast introduction of the fighter version into series man-

GvIAP under the command of A E Novozhilov was the first to get the new fighters in April, and on 15 May having already mastered the new Kittyhawks, its pilots re-entered combat operations. Around the same time, the 122nd IAD of Air Defence Force received the first Kittyhawks to replace the Hurricanes, which had been the only type in service in the unit.

Combat operations

Since the western allies were using the P-40 mostly in the low-to-medium level fighter, ground-attack/fighter-bomber roles, the aircraft's design improvements primarily addressed the specifics of such use, such as the armour protection being enhanced and bomb carriers introduced. Maximum speed and range had increased, by virtue of better aerodynamics and the more powerful engine. However, those improvements were achieved at the expense of increased weight, resulting in a reduced climb rate and service ceiling, increased turning time, take-off distance and especially the landing run. All these shortcomings were clearly revealed during P-40E testing at the NII VVS in July 1942.

Having studied the aircraft's strong and weak points, military experts sought suitable areas for the Kittyhawk's application. Meanwhile, more and more fighters arrived in the Soviet Union.



Commander of the 154th IAP, A A Matveev near his Kittyhawk. Note the area of white temporary winter camouflage on the aircraft's nose

Early in November the P-40Ks arrived at Krasnoyarsk. However, two fighters were missing; they had lost their bearings in the thick fog on their way from Uelkal. The second batch of fighters departed via that route on 3 November. In total forty-three P-40s, (all K series), were delivered via the ALSIB route.

The P-40K's distinguishing features included a more powerful V-1710-73 engine and a fuselage fairing into the leading edge of the fin. From the P-40K-10 onwards, the Kittyhawk's rear fuselage was stretched. The next version was the P-40M with a V-1710-81 powerplant, which demonstrated slightly higher maximum speed and better climbing characteristics. This version was built by the Americans for export only.

The P-40N

The last sub-type produced of this large family was the P-40N, which became the final attempt to improve the aircraft without totally redesigning it. However, the changes were extensive.

In order to reduce the fighter's weight, the designers introduced aluminum radiators and new mainwheels, removed one fuel tank, reduced the ammunition load, and even removed two out of the six machine guns on the aircraft of the first sub-series. From series N-5 onwards, a new cockpit canopy section with an improved field of vision was introduced. These aircraft were also delivered to the USSR in large numbers.

A total of 487 Kittyhawks was accepted by the USSR during 1942. In November, this type was

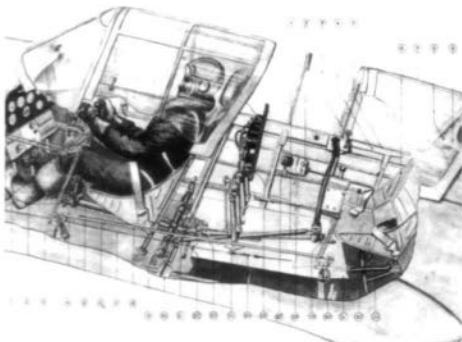


Illustration of the layout of the Kittyhawk training version, made by the Workshops of the North Fleet Air Force

introduced into service at the 2nd GvSAP of the North Fleet. By the end of that month, the 46th IAP, commanded by Major Mukhin, arrived at the North-Western Front. The unit was allotted to the 5th GvIAD and began its combat operations from Vypolzovo airfield.

The regiment operated above the Demyanskij Corridor through which the encircled German 16th Army drew supplies from Staraya, Russa. Early in 1943, the 2nd squadron of 45th IAP commanded by I M Dzusov was also re-equipped with Kittyhawks. After that, frontline units' rearmament was combined with Reserve Regiment conversion training on Kittyhawks.

The key training site was the 22nd ZAP (Reserve Air Regiment) in Ivanovo. In 1943, twice as many Kittyhawks arrived (939) and the number of air units equipped with them further increased. At different times, over twenty regiments were engaged in combat operations flying these aircraft.

Air Defence system

From 1943 onwards, the main flow of new Kittyhawks was redirected towards the Air Defence system. There were fairly good reasons for this. The commanders wanted to use the fighter's advantages. Powerful armament – whilst the P-40E was inferior to the German Fw 190A-3 and



Kittyhawk in the course of modification into a two-seat reconnaissance version, Leningrad Front



P-40EF two-seater, 'white 34' used by the 191th IAP at the Leningrad Front in 1943.

British Spitfire Mk Vb counterparts from the standpoint of its firing rate per second, it had better firing characteristics than the German Messerschmitt Bf 109F and the American P-39D; better flight range and duration; survivability; and good, (in comparison to Soviet aircraft of that time), radio and instrumentation equipment. Therefore, the key areas of its application were air coverage of cities and critical facilities in the Air Defence system, escorting bombers and torpedo carriers, fighter-bomber and ground-attack missions, and aerial reconnaissance.

Attitudes of Soviet pilots towards the Kittyhawk were twofold. On one hand, they valued it higher than the Hurricane; on the other hand, their practice suggested that the Kittyhawk's combat capabilities were rather limited.

Referring again to V M Petrov, "Our frontline pilots liked its large cockpit with good rearward vision and fine navigation instruments... However, in general, it was a mediocre machine, considerably overweight." B V Veselovsky of 46th IAP wrote in his memoirs, "Our 'kitties'... were inferior to the 'messers' in many aspects. They were slower and much heavier, making air combat in verticals a difficult task. So we preferred to fight in horizontals..."

Whilst being not fully suitable to combat with the enemy fighters, the Kittyhawk's speed and powerful armament made it an effective weapon against enemy bombers. At 4,500m and higher altitudes, the P-40E was faster than the Yak-1, although its V-1710 was treated as a low-altitude engine in the West.

P-40 Night Fighters

Long cruise flight duration allowed it to stay above the area or object of air cover for a long time. As an interceptor, the Kittyhawk had two major limitations – insufficient service ceiling and poor climb rate. Nevertheless, it was regularly used for that application both in day and night time. Without any target-finding devices, the P-40 could not perform autonomous air missions in the moonless nights, and insufficient navigation equipment hindered operations under command from ground control stations due to the difficulties with orientation. These shortcomings clearly revealed themselves during the attempt to rebuff the German attack on the American air base in Mirgorod in June of 1944. The fighters of the 310th IAD of the Air Defence Forces took off for interception on the moonless night but failed to find any German aircraft.

Sometimes, however, the Kittyhawk's nocturnal missions were successful. The Kittyhawk was able to carry a SAB-50 flare bomb to be used for

target illumination. The fighters flew in pairs – whilst one fighter illuminated the target from above, the other would attack it.

On the night of 13 March 1943, eight P-40 'night fighters' patrolled the air approaches to Murmansk. In the light of a flare bomb, Senior Lieutenant Bokiy shot down a German Ju 88 bomber which crashed near Kod-Yavr Lake.

Some Air Defence units had specially assigned bombers for the target illumination. Such aircraft carried six SAB-100 flare bombs and dropped them one by one in order to illuminate the targets for the attacking fighters underneath.

For better navigation during night time and in poor visibility, some P-40s were equipped with Soviet RPK-10 fixed-loop radio direction finders. The ring of the direction finder antenna was mounted on top of the fuselage behind the cockpit. For instance, in August 1944, the 309th IAP of the Air Defence Forces had a radio direction finder on every third Kittyhawk.



Illustration of the layout of the rear cockpit of the two-seat light bomber version, prepared by the Workshop of the North Fleet Air Force

From early 1944, after the radar observation network had been sufficiently developed, the fighters began to be equipped with Sch-1 'friend/foe' transponders. By the end of 1944, over 900 Kittyhawks had been in service with Soviet Air Defence Forces. By the date of Germany's capitulation, six Air Regiments were fully equipped with these fighters, and a number of regiments had a few aircraft of this type in their service.

Soviet Naval Aviation

The P-40's long flight duration made it attractive for naval aviation. As mentioned previously, the first fighters of this type were transferred to the Navy in the spring of 1942 and joined the 2nd GvSAP of the North Fleet Air Force. These Kittyhawks were primarily used for providing air cover for supply convoys.

By the summer of 1942, naval pilots received twenty-seven Kittyhawks, followed by another twenty-one fighters in 1943. These quantities sufficed to cover losses only. However from the second half of 1943, P-40s of different sub-types started to arrive in their hundreds. Finally, their number in Soviet naval aviation far outran the quantity of Hurricanes. By the end of 1943, the North Fleet re-equipped its 27th IAP and 78th IAP with Kittyhawks. On the other hand, the 2nd GvIAP (ex-2nd GvSAP) switched from the P-40E to Airacobras.



P-40E modified by the 1st Aircraft Repair Base at Leningrad Front for the installation of an M-105R engine and V1Sh-61P propeller in 1942. Note the rocket projectile launching rails under the wing

Since 1943, the Kittyhawks were delivered to the Black Sea Fleet and allotted to the 7th IAP and the 62nd IAP Regiments. By 1 January 1944, these units had already received ten P-40Ks each.

"The first Kittyhawks were transferred to the Navy in spring 1942 and joined the North Fleet Air Force..."

Both regiments' equipment composition was quite diverse. In the 7th IAP, the P-40K fighters served together with MiG-3s, Spitfire Vbs and I-15bis fighters. In the 62nd IAP they were complemented by LaGG-3s, I-153s and I-15bis fighters.

The first combat mission of the American fighters was to provide air cover over the Caucasian Black Sea coastal area at Dzhubga-Gargry and Gargry-Kobuleti segments. The Kittyhawk



This P-40M made a forced landing and was captured by Finnish forces.

squadrons were based at Myskhako, Lazarevskaya and Mikha-Tskhakaya airfields and carried out routine air patrols and, occasionally, interception tasks against German air reconnaissance aircraft.

On 22 April 1943, the Kittyhawks participated in defending Poti during a German bombing raid. The 7th IAP Commander K D Denisov, flying a Kittyhawk, shot down a German Ju 88 bomber in the vicinity of Kulevi. On 25 to 27 June 1943, the regiment's fighters provided air cover for Joseph Stalin's ship on its way from Batumi to Tuapse and back. On 26 June, the Germans attempted to attack the ship from the air but were repelled by the fighters.

From the summer of 1944, the aircraft of the 7th and 62nd Regiments started to perform air cover missions protecting the transports and war-

instance, in the 78th IAP), or as a combination of an FAB-250 plus two FAB-100TsK, or FAB-250s plus two ZAB-100 incendiaries.

On 10 May 1944, two groups of Kittyhawks bombed Hebugten and Salmiyarvi airfields, with no losses. Bombing attacks on Kirkenes on 13-14 May were very successful.

At first, the fighters of the 78th and 27th IAPs performed dive-bombing attacks. One of the FAB-100s destroyed a 6,000 ton transport ship with a direct hit, and a smaller ship was forced to run aground after another direct hit. On the following day, the Kittyhawks performed a mast-top bombing attack. The bombs were dropped from just above the sea's surface to ricochet off the water, and detonate against the ships' side. One transport ship was set on fire; another one and a coast-guard also suffered damage.

An interesting fact is that the results of the fighter's bombing attacks were better than those of the Il-4 bombers despite the lack of bombsights on the Kittyhawks.



Kittyhawk being refuelled at Abadan, (Iran), on its ferry flight to the Soviet Union

ships in the open seas, along with escorting bombers and torpedo carriers. On 20 August, they escorted bombers and attacked aircraft in a raid on Constantza.

In the North Fleet, the Kittyhawks were actively employed in the fighter-bomber role. The standard P-40E bomb load included a single high explosive FAB-250 bomb under the fuselage. This was sometimes increased to a single FAB-500, (for



P-40Ks lined up at an Alaskan air base awaiting ferrying to the USSR

During two days of raids, the North Fleet units lost only one Kittyhawk, from the 78th IAP. The mast-top bombing tactics were regularly repeated subsequently. For instance, on 11 October 1944, a group of fighters from the 78th IAP, under the command of Captain V P Strelnikov sank two barges and five motor boats. During the fights near Petsamo, the 78th Regiment's 'mast-top bombers' sank thirteen enemy ships, including a 3,000 ton vessel.

The mast-top bombing was a risky undertaking, though, because the aircraft approached the ships at about 20m altitude. On one occasion the pilot, Lt Proyavko, failed to turn from the ship in time and the ship's mast tore off about one-third of his wing together with the aileron. However, he managed to get back to his base airfield. On aver-

age, it took two to five FAB-250 bombs to sink an enemy ship with a Kittyhawk 'mast-top' attack, which was a much better performance than attacks from normal altitude horizontal flight.

In June 1944, the 30th Field Workshop of the North Fleet built a specially modified two-seat version of the Kittyhawk to be used as a light bomber. The second cockpit, arranged behind the main one, accommodated a bomb-aimer/navigator with the bombsight. However, the aircraft did not go beyond prototype stage.

The Soviet Navy tried also to use their Kittyhawks for searching out enemy submarines. The fighters flew in pairs at low altitudes. However, no submarines were spotted, which was not at all surprising because of the aircraft's relatively high speed and limited downward field of vision.

P-40s were used for bombing purposes against land targets as well. The opportunity to employ them as light day-bombers seemed especially topical in 1942 when the acute shortage of front-line bombers forced the People's Commissar of



Captains V P Pokrovsky and P I Orlov playing draughts in front of a P-40 of the 2nd GvIAP, North Fleet Air Force, Vaenga airfield, 1942

Defence to issue a special Decree on 'Fighter Aviation Battlefield Utilization for Day Bombing Purposes'. Sometimes, the Kittyhawk's ground-attack capabilities were enhanced with four RS-82 rocket projectiles carried in pairs under each wing, just as had been practised with the Tomahawks.

Photo-recce P-40s

Curtiss fighters, equipped with AFA-I cameras, were used for photo-reconnaissance purposes. In this role, they were employed in one of the squadrons of the 118th Separate Air Reconnaissance



P-40E of the North Fleet Air Force, 1942, still finished in the original manufacturer-applied Dark Green/Dark Earth disruptive camouflage scheme on the upper surfaces



P-40M during testing at NII VVS. Note the original USAAF serial across the fin

sance Regiment (ORAP) and were found, (along with the Spitfire), to be a most appropriate aircraft for such missions. By the end of 1944 they had fully replaced Hurricanes, Airacobras, Yak-1s and LaGG-3s out of the role. The Kittyhawks carried out both inland and offshore reconnaissance missions. In particular, they made a significant input in to the preparation of the Pechenga-Kirkenes operation, flying from the advanced airfield located in Pummanki.

On the Black Sea, the 3rd Squadron, under the command of Captain Yu N Novikov, of the 3rd ORAP operated seven P-40Ks from 1943. The squadron aircraft performed independent air reconnaissance missions from Bugaz airfield – both inland and offshore – and escorted the Bostons of the bomber regiment based at Myskhako.

For instance, in June 1943 they took part in the simultaneous photography of twenty-nine ports of the Black and Azov seas. The four-hour concerted mission resulted in a complete picture of the enemy force's disposition being made available to the Black Sea Fleet Headquarters. In August 1944, the fighters based at Tsentralny airfield near Odessa made photo-reconnaissance coverage of Constanta before the massive raid by Soviet Naval Aviation.

Similar aircraft equipped with AFA-I cameras were employed in a number of the Air Force fighter regiments as well. At Leningrad Front, the 1st Aviation Repair Base built a two-seat P-40EF reconnaissance version. The available photos suggest that it was a modified P-40K-5 rather than a P-40E. The aircraft was completely stripped of its armament to clear the space required for additional fuel tanks. An American Fairchild K-13 camera was installed in the rear fuselage, whilst a bombsight was mounted at the navigator/photo-opera-

tor's station, which was used for target aiming.

The prototype successfully passed testing at the NII VVS. The aircraft's performance remained virtually unaffected. However, at that point the customer suddenly changed the requirements for the field of vision from the rear cabin, which could not be implemented within a Kittyhawk. The only P-40EF was transferred to the 13th Air Army where it remained in service for some time.

Soviet-engined P-40s

In 1942, in Leningrad, the same Repair Base modified a P-40E for installation with Soviet M-105P and M-105R powerplants. More than forty fighters underwent such modification. However it was a forced measure due to the lack of spare engines.

Performance of the aircraft with the M-105P engine and VISH-61P propeller deteriorated. In particular, the maximum speed decreased from 477km/h to 465km/h. The modified aircraft's external appearance also changed. There was no air intake on top of the engine cowlings, the exhaust pipe manifolds were of a different shape, and the propeller spinner was much smaller in size.

All aircraft with M-105P and M-105R engines went to the 196th IAP, which operated above Lake Ladoga. Four fighters of that regiment were permanently attached to the 12th Separate Spotter Squadron for the purpose of daily escorting the spotter aircraft.

Two-seat Kittyhawks were also built for the purpose of pilot routine and conversion training. Usually they were custom-made and could have open or closed type cockpits utilizing the units



P-40E during testing at NII VVS. Note the original manufacturer-applied Dark Green/Dark Earth disruptive camouflage scheme on the upper surfaces

from Yak-7 and UTI-4 fighter trainers. Sometimes such trainers were designated as P-40UCh.

In combat operations, the Kittyhawk demonstrated both its strong and weak sides. The important advantage of all P-40s was their structural strength and survivability. The evidence of that quality was the large number of successful ramming attacks performed by the fighters. The first one was undertaken by the 154th IAP pilot V A Chirkov, who on 20 January 1942 rammed his Tomahawk into a German aircraft in the vicinity of Pogostye.

In March 1943, two Kittyhawks of the 768th IAP encountered twelve Messerschmitt 109s. In that dogfight, Lieutenant V Nikolaev rammed one of the German fighters and safely parachuted down. And Hero of the Soviet Union A S Khlobystov performed three successful ramming attacks – on 8 April 1942 – two of them within the same air combat! Furthermore, he hit the enemy aircraft with the same starboard wing and still managed to bring his fighter home.

The Kittyhawk inherited a number of the Tomahawk's shortcomings, though. First of all, those related to the aircraft powerplant. "Allison engines were subject to frequent failures caused by 'shavings'..." stated a report from the 436th IAP in September 1942 after they had experienced sixteen engine failures.

The actual engine life at that time did not exceed 30 to 40% of the nominal value, and every third powerplant went out of order after about 30 hours of operation. The underlying reasons were clear: poor quality and purity of Soviet oil and fuel, and extensive use of boosted engine modes.



191st IAP pilots, in front a P-40M, being briefed on the Leningrad Front, in 1943

"Transition of the 7th and 62nd IAP to newer aircraft types was completed in November 1944..."

As the ground crews gained experience of engine maintenance, the situation improved. The proper selection of oils, careful post-repair adjustments, strict compliance with the maintenance schedules and optimal performance modes were the essential components that eventually helped to increase the engine service life to the nominal figure.

Besides the problems with the engines, two frequent failures are worth mentioning: rupture of the pipe between the fuel pump and carburetor; and tearing-off of the machine gun flame-damping tubes.



P-40N, 'white 46' of the Leningrad Air Defence Force, early 1945



Line up of P-40Ms of the 7th IAP of the Black Sea Fleet Air Force. Note the mix of light and dark spinners

In wintertime, Kittyhawk maintenance required additional wrapping of the pipelines and replacement of the oil pressure gauge. To ensure complete oil and coolant fluid draining, additional dump valves were mounted in the main pipelines. The Allison engines were operated with the use of either regular Preston anti-freeze, or its Soviet alternative (after reduction valve replacement), or had to be modified for the use of hot water similar to the system arranged on Hurricanes.

Later operations

Later in the war, most of the Kittyhawks were distributed between the Air Defence Force and Naval Aviation. Air Defence had 844 P-40 aircraft, which were being gradually replaced with P-39, P-63 and Soviet-made fighters. During the war, the Kittyhawks of the Air Defence Force shot down 255 enemy aircraft (6.5% of the total number destroyed). In Naval Aviation, the number of Kittyhawks was also reducing.

Transition of the 7th and 62nd IAP to newer aircraft types was completed in November 1944, ie after Bulgaria and Romania had joined the Allies' side. Having lost the bases in those coun-

tries, fighters remained in service until the end of the war and even during the first post-war years. For example, the 54th Regiment continued to use P-40s until May 1946 when P-39 Airacobras arrived to replace them.

Military operations against Japan went without P-40 participation. Only two aircraft of this type arrived the Theatre, in June 1945, with the 27th IAP from the North Fleet, and were used only for training purposes.

In the USA, production of the P-40 family aircraft ceased in 1944. In the same year, delivery of these aircraft to the Soviet Union was discontinued. According to Soviet sources, the Air Force and Air Defence Force accepted a total of 247 Tomahawks and 1,887 Kittyhawks. Naval Aviation P-40 usage should also be added to that number. The American reports state that a total of 2,097 P-40s was accepted by the Soviet side. Other batches included the Tomahawks re-exported from the UK, plus unserviceable aircraft shipped as a spare parts source.

The exact P-40 break-down by version is not known. However, US reports show that 313 P-40K, 220 P-40M and 980 P-40N fighters were amongst the aircraft delivered.

Soviet Naval Aviation received 311 Curtiss P-40 fighters, of which about 90% represented different Kittyhawk versions. According to other sources, together with the aircraft transferred from the Red Army Air Force, the Navy received 321 aircraft, including 211 at the North and 109 at the Black Sea Fleets.

The P-40 was used by Soviet pilots to fight the enemy with the same courage as they did on other combat aircraft. For example, Major Naydenko had claimed sixteen German aircraft shot down by May 1942 flying the Tomahawk and Kittyhawk, and was awarded the Star of Hero of the Soviet Union (HSU). P A Pokryshev of the 154th IAP became HSU twice, and more than a dozen other pilots of that regiment were honoured with this award, including the earlier-mentioned V A Chirkov.

In March 1945, Naval Aviation pilot Captain Strelnikov was awarded with the HSU title for his outstanding performance in 'mast-top' strikes. The famous North Sea ace B S Safonov also flew the Kittyhawk until his death. The highest scoring ace among the P-40 pilots was Captain S M Novichkov of the 67th GvIAP who claimed nineteen German aircraft 'kills'.

After the war, the Kittyhawks and the last few Tomahawks were soon phased out of service. On 22 March 1946, the USSR Council of Ministers ordered the write-off of 1,086 P-40s by the end of the year. The last few aircraft were used as trainers and survived until the end of 1940s.

Today, the only remaining Kittyhawk in the former Soviet Union is exhibited at the North Fleet Air Force Museum. Unfortunately, its appearance is badly distorted after a failed attempt to restore the aircraft. **MAM**



The finished aircraft was taken outside for a photo session in natural snow. In the end I got the unique Soviet version of the P-40 – white and on the cold snow

White, cold and snow

Mikhail Neradkov converts the 1/48 scale Revell/Monogram P-40E into an M-105-engined version using the Griffon resin conversion

First and foremost, I have to admit that the references for this aircraft version are not exactly thick on the ground. There is an article in an old publication called 'Ace', (a Russian aviation magazine), one known photo in RedStars 4 and three colour profiles that have appeared in several books. Scale drawings can be found in the AJ-Press Monografie Lotnicze 65, 'P-40 Part 2'

Despite the fact that the Griffon resin conversion set is designed for the Hasegawa P-40E, I decided to insert it into the old Revell/Monogram offering, which I had started on some time ago. Several of the parts had already been 'assembled', so the work was going to be 'interesting'... however, as the old Russian saying goes, "What does not kill us – makes us stronger!" **MAM**



I also added CMK resin wheels bays and an Aires cockpit



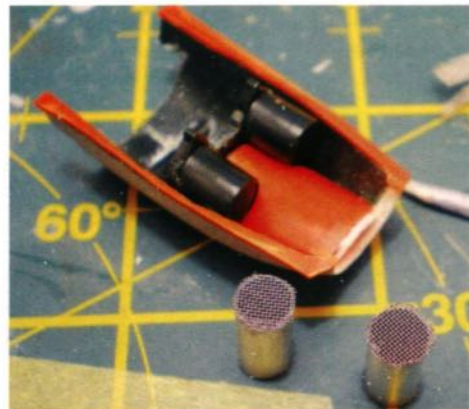
Ailerons and rudder faced with plastic card ready for re-attaching



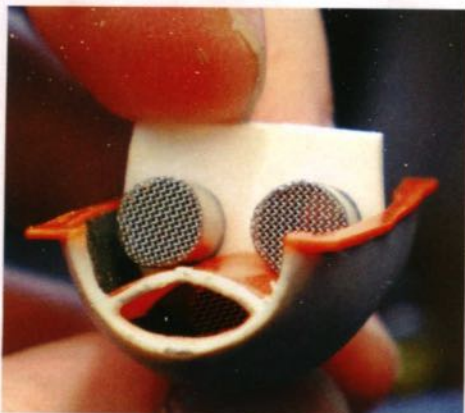
The oil coolers were made of thick metal foil and some photo-etched parts were added with small size metal mesh



CMK resin gun bay was inserted into the wing (although I decided not to use all the armament details on this kit).



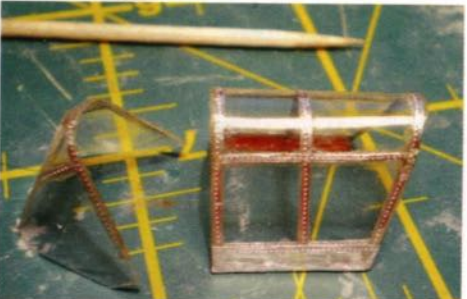
The oil coolers being fitted within the lower cowling



The finished oil cooler assembly



...and imitation fabric was applied



Canopy framing was made of self-adhesive metal foil, which was stripped of its original glue and then attached with Micro Metal Foil Adhesive



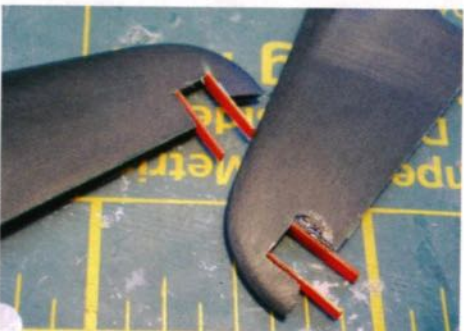
The cockpit interior was painted with AKAN acrylics, coated with Future and given a wash of artists' oil paints, over which a layer of matt varnish was applied



Metal foil was applied over the whole gun bay area underneath the wing



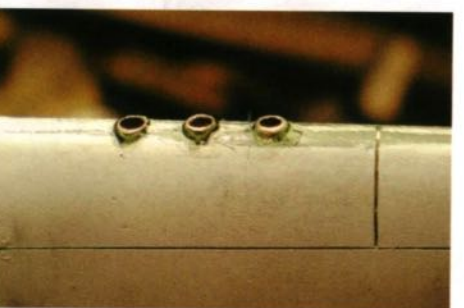
The original engine cowling was cut away and replaced with resin parts



Horizontal stabilisers received control surface attachment brackets made of metal, whilst the control surfaces got attachment pins. Weak areas were the stabiliser tops which broke away several times, and were finally attached with thin pins



The rails for the canopy sliding part were made of plastic, however they would perhaps be done better in metal to look more realistic



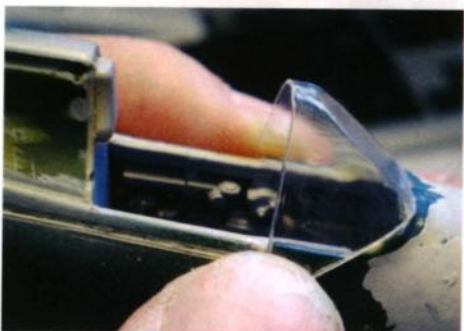
The machine gun ports were made using several metal tubes...



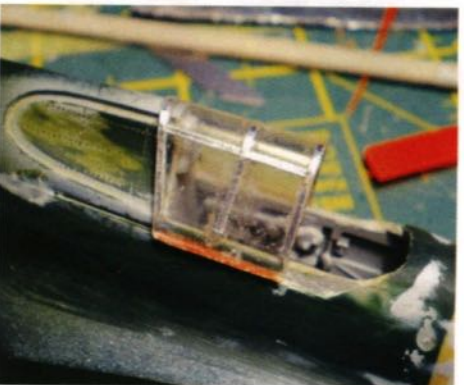
The wing fairings were covered by pieces of metal foil...



The control surfaces were cut off...



Squadron/Signal's vacformed canopy is designed for the Otaki/ARII P-40E kit and does not fit the Revell/Monogram kit all that well – so some cutting and adjustments were required



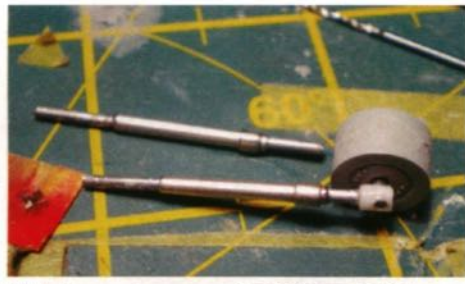
Then the canopy was washed in Future and 'rivetted'



... of different diameter inserted into each other



...which was also used for various hatches



The landing gear legs were scratchbuilt from metal tubes



Then, my least favourite procedure – panel scribing. It is usually associated with the use of multiple rules, templates, drops of Mr Surfacer and large amount of swearing!



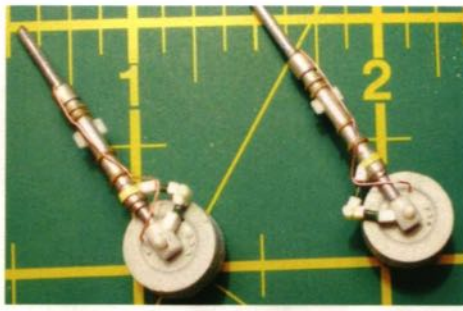
...which was followed by the dark lines of the pre-shading. Note that the pre-shading was applied only on the under surfaces as the white winter camouflage would be on top.



... which was then carefully removed in different areas with the help of cotton swabs moistened in isopropyl alcohol



The decals were coated with several layers of Future, and finally polished



...wires and pieces of plastic



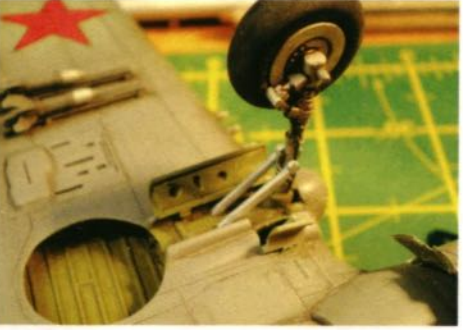
Finally I got all the lines scribed and riveting applied



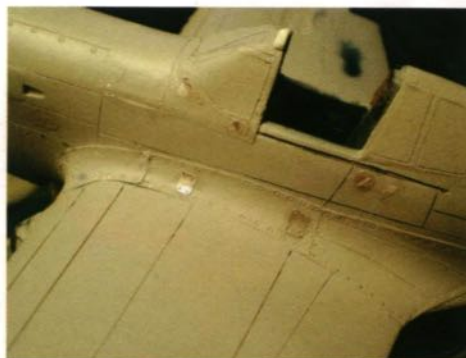
Then came the standard Olive Drab/Neutral Gray combination, painted-over US markings and the engine cowlings covered in Soviet AMT-4 paint



The exhausts were painted to imitate steel, then actively processed by RustAll liquid, and washed by dark paint and pigments



The starboard undercarriage leg



After a first layer of Tamiya Surface Primer from the can, the long sanding and polishing process started, which was followed with several more coats of primer



First layer of paint was metallic...



The top winter camouflage layer was represented by several uneven coats of white Tamiya acrylic paint...



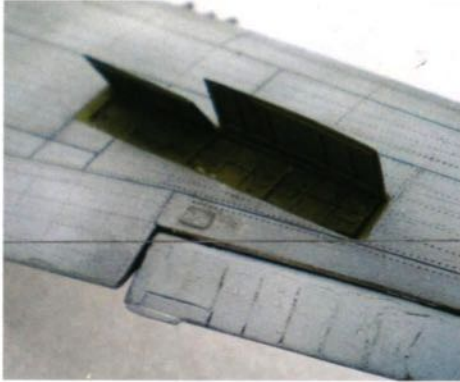
Decals were recruited from various sources: the numbers and stars from a South Front Yak-1 and stencils from the spares box



The tailwheel leg



The model was armed with a pair of RS.82 air-to-air rockets under each wing





First of the Luftwaffe's fighter-bombers

Ian Day builds Eduard's 1/48 scale Bf 110 as an Erprobungsgruppe 210 fighter-bomber

Mention wartime fighter-bombers and most people think of swarms of Typhoons roaming over the Normandy beaches, playing havoc with everything German, but now is the time to give a thought to the origins of the World War Two fighter-bomber as we know it today...

Having its origins over the Western front during the First World War, German Schlachtflieger and Allied Trench-strafers brought ground-attack into modern warfare. However, these lessons were lost during the intervening years and it was left to the embryonic Luftwaffe to experiment and rediscover the principles in the Spanish Civil War.

Ground support had arrived, but the 'interdictor' idea had not yet germinated. Whilst the Stuka units came within the definition of ground-attack, they were strictly bombers and had to be escorted to and from the target. The idea of the bomber then reverting to a fighter role had not yet arrived.

On 1 July 1940, Experimental Wing 210, (or Erprobungsgruppe 210 to give it its German title), came into being, under the command of Hauptmann Walter Rubensdorffer. Originally intended to test the new Me 210, (whose production had become delayed), the commander of the new unit had certain ideas on fighter-bomber tactics and



EprGr 210 was to be the instrument with which he would test his theories.

The Gruppe consisted of three Staffeln. 1 Staffel was formed from parts of 1./ZG 1 and was commanded by Oberleutnant Martin Lutz. 2 Staffel was formed from 3./StG 77 commanded by Oberleutnant Wilhelm-Richard Rossiger. EprGr 210's third staffel was freshly created and led by Oberleutnant Otto Hintze. Both 1 and 2 Staffeln were equipped with Messerschmitt Bf

110s and 3 Staffel with Messerschmitt Bf 109s.

The Bf 110s carried the unit identification codes 'S9' whilst the Bf 109s carried only individual aircraft numerals. It should be noted here that the Bf 109s were brand new E-4/B models, factory-produced to be fitted with either ETC 250 or 500 bomb racks. However they do not appear to have been fitted with the supplementary head armour or armoured windscreens, although they did have the later-style 'square' canopy. Also, 1 Staffel were



"The Bf 110s carried the unit codes 'S9' whilst the Bf 109s carried individual aircraft numerals..."

— as far as I am aware — the only unit in the Luftwaffe to be partially equipped with the Bf 110C-6 sub-type, of which more later.

The unit was transferred to Denain in France on 10 July where they came under the control of II Fliegerkorps and were immediately involved in the attacks on British convoys, starting on 13 July. Attacks on ships were quite often made at low level, giving the defending gunners little warning or chance to retaliate. The unit's first 'kill' was a Blenheim of No.15 Squadron, downed on 18 July.

Attacks on the British mainland commenced on 19 July with two raids on Dover. Shipping in the harbour was dive-bombed by the Bf 110s of the unit. A common error by the RAF first appeared at this point. The Bf 110s were described as Ju 87s by No.32 Squadron — dive-bombing by fighters had not yet been conceived as far as the RAF were concerned.

What is also unusual about this attack is that certain of the Bf 110s were the Bf 110C-6 sub-type armed with four 7.92 MGs and a 30mm cannon in an underfuselage gondola. This was the MG 101, forerunner of the later MK 103 and MK 108 weapons. Not particularly effective against shipping, the cannon also had a tendency to jam after a few rounds. Despite not being demonstrably effective, the Bf 110C-6 continued to be used by EprGr 210 throughout the Battle of Britain, although the sub-type was unknown to the RAF until the first example was shot down over Crawley on 15 August.

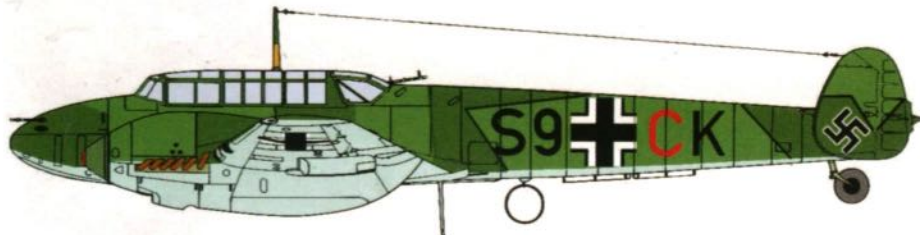
What was also beginning to be noticed was that the standard eight 0.303 inch machine-gun armament of the RAF fighters was having difficulty in shooting down the larger enemy aircraft. One of EprGr's Bf 110s arrived back at its base with over 78 hits on the machine!



By the end of July, EprGr 210 had sunk 80,000 tons of shipping, including four warships. Keeping with the convoy attacks, some very successful raids were made, the sinking of an 8,000 ton ship on 11 August in particular, but losing two Bf 110s on that occasion.

EprGr 210 was becoming a thorn in the side of the British — not bad for a three-Staffeln unit whose combat losses to date had been a mere three Bf 110s. From August onwards, the unit became more involved in attacks on mainland Britain. EprGr 210 was to see its greatest triumphs, and as is so often the case in war, its greatest defeats, during this period.

On 12 August, the Bf 109s of 3 Staffel attacked Dover radar station with 1 Staffel attacking Pevensey and 2 Staffel bombing Rye. The Gruppe Kommandeur attacked the Dunkirk Radar station. Additionally, the He 111s of KG 51 attacked Ventnor Radar station. All except Dunkirk were put out



Messerschmitt Bf 110C, S9+CK of Eprobungsgruppe 210, France July 1940

Finished in the original scheme of RLM 70/71 'splinter pattern' upper surfaces with RLM 65 undersides, S9+CK was damaged by a Spitfire on 21 July 1940, crash-landed at its base and subsequently written-off. The name 'jaguar' was applied to the nose and the aircraft carried exhaust shields on the inboard side of both engine nacelles

of action, but all were 'back on the air' within a few hours, with the exception of Ventnor which took three days to get up and running again. Finding the masts difficult to bring down, the Luftwaffe never pressed home their attacks on the radar chain. Perhaps if they had, the Battle of Britain may have ended differently?

In the afternoon of the same day, EprGr 210 attacked Manston airfield, together with Dornier 17Zs from KG 2. The RAF was forced to abandon the airfield and retire No 600 Sqn to Hornchurch. The attack by EprGr 210 was carried out from 3,000 feet, with KG 2's attack in from 11,000 feet. Ground defences had no time to get into action before the damage was done.

Also on 12 August, EprGr 210 raided Hawkinge, a raid previously ascribed to Ju 88s. The raid was carried out similarly to the one on Manston and caused heavy damage to the airfield. However neither airfield was put out of action totally. It should be appreciated at this point that EprGr 210 had done what was asked of it and rightly looked on the raids as a success.

"Eagerly awaited, Eduard's Bf 110C/D/E range of kits seem to have aroused some controversy..."

Similar raids in Poland and France had reduced the aerial opposition to almost nil. The vital element that was missing now, was the rapid advance of the ground forces and the subsequent capture of airfields. This was of course not possible and the RAF's repair organisations were able to make good any damage. As with the radar stations, constant bombardment was required to remove an airfield from active service. Having said all this, 12 August was the greatest day for EprGr 210 in their short history.

Hornchurch was again attacked with total surprise on 14 August. But the following day, it was to be EprGr 210's turn for a surprise.

The unit attacked Martlesham Heath in the morning, and Croydon in the afternoon. They should have attacked Kenley. Rubensdorffer must have mistaken one for the other in the afternoon mist and dived to attack the airfield 3,000 feet below. Unfortunately, at that point in time, No.111 Squadron were above him and No.32 Squadron joined in minute later.

At the end of this action, EprGr 210 had lost eight Bf 110s and a Bf 109. One of those killed was Gruppenkommandeur Rubensdorffer. He was the first of four Gruppenkommandeurs that EprGr 210 was to lose in the Battle. Croydon suffered heavily but its damage did not affect the Battle in any way. Aircraft were still operating from there at the end of the day.



Eduard Bf 110C kit box top artwork

Manston was finished as a fighter base on 24 August, and on the 30th, the Gruppe turned its attention to Biggin Hill. This has been recorded by the RAF as an attack by Ju 88s, but was in fact an EprGr 210 mission. Biggin was left a shambles and sector control passed to Hornchurch until repairs were made.

On 31 August, EprGr 210 once again returned to Croydon, only (sic) losing one machine in this raid. Damage to the airfield was not extensive. The raid lasted just six minutes. Martin Lutz was acting Gruppenkommandeur during this period.

The next raid on England was made on 4 September, led by the new Gruppenkommandeur, Hans von Boltenstern. Sighting RAF fighters lining up for a firing pass, von Boltenstern 'bunted' his aircraft without sufficient height. He crashed into the Channel and was killed – without the RAF having fired a shot. The raid on the Vickers works brought production to a standstill for several days and Lutz, for the second time, became acting Gruppenkommandeur. He led the next raid by EprGr 210 on Brooklands.

On 7 September 1940, Lutz was finally appointed Gruppenkommandeur and was to lead the unit until his death. The next series of raids were on the Supermarine works at Southampton. Production was halted on 26 September when the works were heavily damaged. By this time, however, Spitfire production had started at Castle Bromwich and the loss of production at Southampton did not greatly affect deliveries.

A major raid by EprGr 210 on the Parnall factory at Yate, Somerset, resulted in the loss of Martin Lutz, killed when he was shot down by Hurricanes of No.504 Squadron. He was replaced as Gruppenkommandeur by Major Werner Weymann.

In the air, however, the unit was usually led by Wolfgang Schenk. This apparent discrepancy is explained by a Luftwaffe High Command order that, in combat, all units should be led by the most

experienced pilot. Schenk commenced the unit's training as he believed that their heavy losses were due to bad flying. The standard defensive circle was practised by the unit, as losses were always lower in properly formed defensive circles. This tactic was later renamed as the 'offensive' circle in a vain hope of boosting Bf 110 crews' morale.

On 5 October, EprGr 210 headed for the gas-works at Becton but 1 Staffel was bounced by Nos 501 and 303 Squadrons – and two Bf 110s were lost. One belonged to the new Gruppenkommandeur, Oberleutnant Weymann. Within the space of forty-two days, EprGr 210 had lost their fourth leader!

It should be mentioned here, that it was very rare for 3 Staffel with their Bf 109Es to operate with 1 and 2 Staffeln. Perhaps the losses of the first two Staffeln would have been less if they had. 3 Staffel lost only two Bf 109s during the Battle to enemy action, both pilots being made prisoner, Oblt Hintz being one of them.

The last raid by EprGr 210 during the Battle was made on 29 October on London. They were intercepted by No.92 Squadron but only one aircraft was lost over England.

During its brief existence, EprGr 210 had shown the value of fighter-bomber attacks on most types of targets. Putting Manston out of action and destroying the Supermarine works were all great achievements for so small a unit. Also, even although losses were heavy, (over forty aircraft either lost or heavily damaged), they were always capable of bouncing back and performing exceptionally well.

Their effect was out of all proportion to their numbers and being fighters, they stood a better chance of surviving and fighting another day, as shown by 3 Staffel's two Bf 109E losses. Even the Bf 110s stood a much greater chance of survival than their bomber counterparts.

In April 1941, EprGr 210 were redesignated SKG 210. Someone in the RAF must have taken notice of the Gruppe's performance in the Battle of Britain, as fighter-bombers were to feature prominently in the RAF's order of battle in the coming years, as indeed they would in the Luftwaffe's...



A flawed gem? Modelling Eduard's 1/48 Bf 110

Eagerly awaited, Eduard's Bf 110C/D/E range of kits seem to have aroused some controversy. Although most agree the moulding quality and level of detail is superb, it's the actual fit of the parts that leaves 'a little to be desired'.

Many reviews of the kit have praised Eduard for the kit, yet some tend to gloss over the faults with, "... it needs a touch of filler..." type statement. My intention is to offer a build guide, whilst actually building the model, from an average modeller's point of view, and as someone who has purchased the kit with his own money and has no-one to please but himself, it's as honest a review as you can get...

Initial look

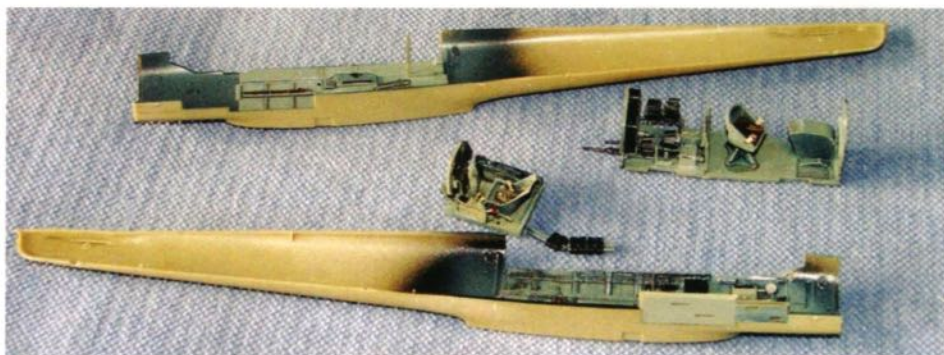
There are so many pieces to this kit, my first impression was 'what a lot of kit for the money'. However, some of the parts are not used and some are a choice of fit. For example, the 'Dackelbauch' belly fuel tank is supplied, but is not appropriate to the Bf 110C/E variant. A later nose cone is on one of the sprues, again, not appropriate for the kit markings.

The parts themselves are, in the main, well moulded, but I did have some flash on the engine nacelles and a couple of other parts – and this was from one of the first releases. The etched fret supplies the seat belts, instrument panel and radiator faces, together with a myriad of smaller detailing parts. A spare instrument panel face is supplied in case a dark grey cockpit is modelled.

Step 1

As with most kits, the cockpit is where construction begins, this Bf 110 being no exception. The level of detail is very good, even down to the individual engine control levers. I recommend drilling individual holes for these, as they are butt joined and liable to 'escape' with the least provocation.

When assembling the main instrument panel, the instrument bezel part is superglued to the plastic support and then the overlay is attached using PVA or, in my case, Formula 560 clear canopy glue. By spreading a thin layer over the instrument faces, some of the clear glue is forced into the bezel recess, creating a clear 'glass' face to the instrument. It's worked every time and saves having to fill the recess with Klear/Future or some



Construction of the cockpit interior

such, as well as forming a strong bond. The rudder pedals can be used, but cannot be seen on the finished model, something that applies to a good many parts in the kit.

Once the pilot's office is done, this can be added to the fuselage, after painting in the required colour, mine being RLM 02 Grau.

Step 2

The gunner's seat is a three-part affair, although two would have sufficed. There is a nasty seam to remove before painting. The cushion is a separate item and is painted to simulate leather, a red brown colour with a dark brown ink wash. The seat is designed to swivel although it's a feature I could have done without, indeed, it was cemented to the mounting anyway.



Close-up of the cockpit interior showing the radio panel detail

The three-part mount should be added to the floor as soon as practicable to ensure the two separate support struts are square.

Each ammunition drum for the MG FF cannon is a three-part assembly. These consist of the drum, drum rear and a photo-etched strap. You can add them all if you wish, but this is a time-consuming job as the straps are small and require four folds each. I limited myself to half a dozen. All were painted black and drybrushed with gunmetal to bring out the detail.

Part B6 is odd. I assume it's for the spent cartridge cases from the rear MG, but the gun has a collector bag mounted on it. I suspect this is to catch the spent cases from an MG 81, a weapon not fitted to early variants of the '110.

When assembling the MG FF mounts, I recommend omitting the two gas charging bottles, they just cannot be seen. I recommend supergluing the ammunition drums to the guns at this stage – otherwise you may find they regularly make a bid for freedom!

Step 3

The observer's seat was modelled in the stowed position. The spare cannon drum units were added, although the four remaining drums don't fill them. I decided that more detail could be seen without filling all the racks.

The radios were assembled. Surprising omissions from the etched fret are the radio faces, but, on the other hand, the raised details of the

plastic parts show up a lot better after painting and drybrushing.

A few saddle drums for the rear MG were assembled. I recommend fitting the straps after cementing them to the rack – less to lose that way. Again a coat of black with a gunmetal dry-brush to pick out the ribs on the drums was used.

Once the side consoles had been painted, I added them to the respective fuselage halves, departing from the instructions here. The reason was to ensure the sides fitted without gaps, which, if assembled as per the instructions, they probably would not. The central instrument console was assembled the same way as the main item but not fitted at this stage.

Step 4

Here's where the major problems began. Getting the fuselage halves together without gaps was an almost impossible task. I added the underside panels with the shell case ejection ports to one half to assist with fitting. I then added the other fuselage half before the cement set fully allowing them to be teased into position leaving a very small gap. Some modellers I know have had gaps just aft of the gunner's position and some underneath just forward of the ejector slots.

Looking into the cockpit, I could see a gap between the floor and side console so I was glad of deviating from the instructions. This may also have helped when cementing the fuselage halves together as I ended up with a small gap (as related above) and a slight step under the centre of the fuselage. So far so good...

Step 5

The nose MGs have a lot of detail which can be added if you want to expose them. I did not and herein lies the problem. At some stage, the model will require painting and I would hate to have to keep touching up the MG barrels after this, assuming none broke off during construction, that is... so I looked for a way to assemble the nose section to allow it to be painted and then add the MGs when all the painting had been completed.

The lower nose section requires some of the mounting lip be removed or it fouls the gun-mounting bulkhead. Also, the rear bulkhead forces open the foremost fuselage join when fitting. However, if the guns are not to be modelled exposed, this part (C6) can be omitted.

The lower nose section had some Contrail tube added to the cannon orifices to simulate the blast tubes. This also eliminated the 'see-through' look that would otherwise spoil the model. Cut level after the glue had dried, they were sanded flush and given a coat of Mr Surfacer 1200 to smooth out any irregularities.

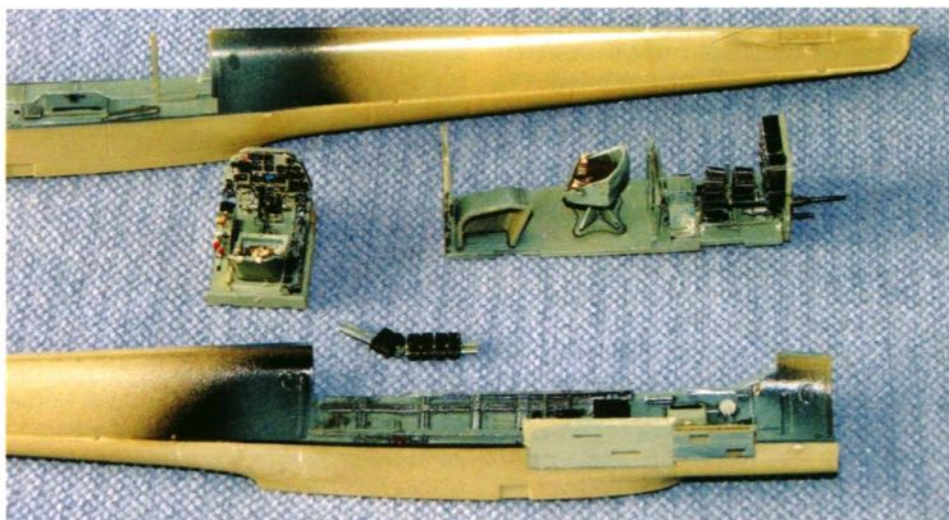


When attaching the lower nose section I found it required clamping into place until the glue set. I used a bulldog clip to make sure it 'stayed put'. Unfortunately, some of the liquid poly seeped out of the join and effectively glued the clip to the model! Some cursing and remedial sanding and filling later, this was not too obvious on the finished model. Again, the top of the nose required some form of persuasion to stay put.

Step 6

This section is where I feel that Eduard has really let the modeller down – the fit of the engine nacelles to the wings is not good. A large gap results if no action is taken on the top of the wing/nacelle join. However, before getting to this stage the wheel bay interior was constructed.

After adding the undercarriage struts, I am of the opinion that parts J16 and J22 need modifying. This part, dainty and well moulded as it is,



Another view of the cockpit interior parts ready for placing in the fuselage halves



The fuselage halves joined

supports the main oleo leg and looks to be a recipe for a regular diet of broken parts! Having added the nacelles to the wings it was too late for this model, but if I build another I am toying with the idea of replacing them with brass rod for strength.

As far as the nacelles go, they will not fit the wings properly without some remedial action. To cure this, or at least 95% of this, I removed about 2mm from the leading edge of the wing where the nacelle fits. The result allowed the cowling to sit almost up to the wing-moulded nacelle section and a touch of filler was all that was required. A

few applications of Mr Surfacer, cleaned off with a cotton

bud soaked in isopropyl alcohol, removed the excess filler, leaving the panel lines undamaged. A swift scribe using a P-Cutter along the leading-edge slat lines allowed this to stand out after painting.

Step 7

Another problem fit area is the attachment of the wings to the fuselage. The locating



Filling and sanding the seam lines

tabs have to be modified as they are too long for the slot. I cut mine down to about 3mm in length.

Then the mating faces have to be sanded flat, as the upper wing halves stand proud as built. Even so, when the upper wing root is almost a 100% fit, there is a large gap underneath. I dealt with this using superglue. As with the nacelles, a swift application of Mr Surfacer and a wipe with a cotton bud soaked in alcohol removed the excess

filler, leaving the wing detail intact.

My plan to add the nose with PVA and paint the model before adding the MGs eventually came to nought. The upper nose requires a great deal of effort to fit. Firstly, I removed the small flanges from the lower nose half. Although they assist location, they will not allow the sides of the upper

nose to lie flush with the fuselage.

Secondly, I thinned the inside of the upper nose section where it meets the fuselage. This gave enough flexibility for the piece to be clamped into position. Before fitting, I added a piece of card inside to mount the MGs on to when the time came to add them.

Step 8

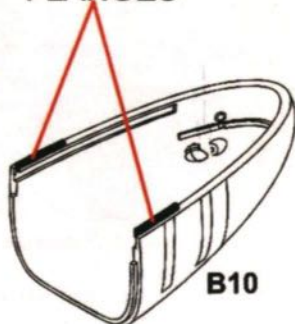
The tailplanes and fins were attached without any trouble at all, so attention was now turned to the undercarriage.

I have been informed that the wheels are incorrect for this sub-type and looking at photos I see what the problem is. The kit wheels are more suitable for an F or G variant. My initial intention was to correct the kit wheels using some card and filler. Although possible, the availability of the True Details replacement items for a nominal sum persuaded me to go this route.

As well as ordering this set from Hannants, I took the opportunity to acquire some Quickboost replacement



REMOVE THESE
FLANGES



B10

THIN THIS AREA



B14

CARD BULKHEAD
FOR MOUNTING
MGs.

Illustration of the assembly of the nose cone parts

exhausts. This lot added about £9.00 to the initial cost of the kit but saved a heck of a lot of work... and they look better into the bargain.

Adding the flaps proved to be 'trouble free', as was the radiator assembly. By this stage the model was ready for the painting stage.

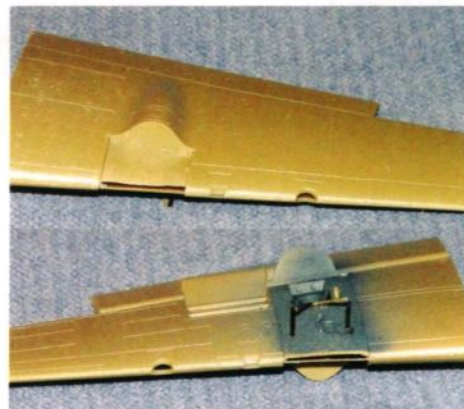
Step 9

Initially, grey primer was used to provide a base for the main colours. After touching up a few 'construction details', the primer was rubbed down with 12000 grit wet&dry and washed.

Looking for the final scheme for the model which had to be a Bf 110 of EprGr 210, it was difficult to find a plain '110C variant, as the majority of aircraft used by the unit were D models. How-



Attaching the engine nacelle...



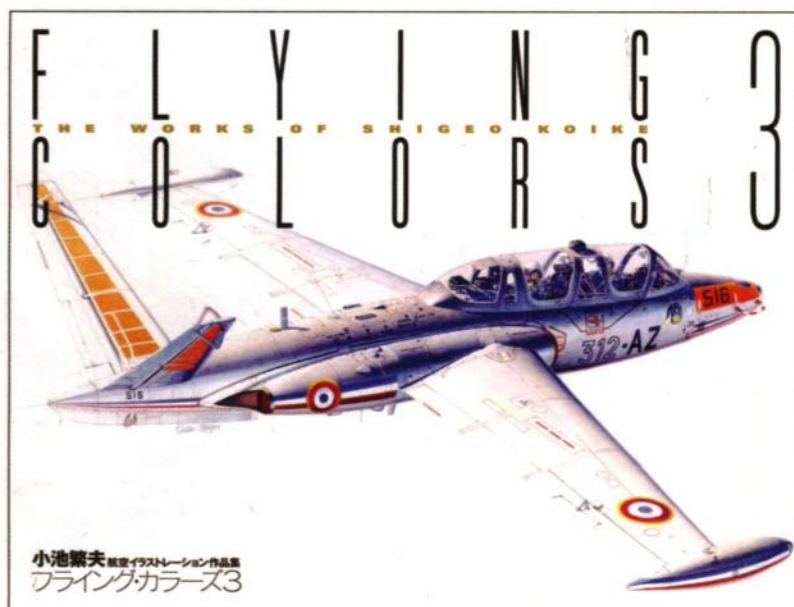
Building the wing and main undercarriage bays

ever, these, for the most part, are indistinguishable from C variants if they don't have the extended tail fitted.

Looking through John Vasco's book, 'Bomb-sights over England - ErprobungsGruppe 210 in the Battle of Britain' (Schiffer Publishing 2002), I espied an early casualty, S9+CK, damaged on 21 July. This is in the early 70/71/65 scheme and was most probably a Bf 110C.

Interestingly enough, it was also fitted with exhaust glare shields, does not have the unit badge on the fuselage, and instead has the name 'Jaguar' on the nose, which appears to be written in two shades, suggesting panel replacement at some time?

Shigeo Koike Soars!



Shigeo Koike is one of the finest aviation artists in the world today. He depicts his subjects with almost photographic accuracy, but Koike has more than an observant eye—he has an artist's vision, too. This new book is a collection of his latest work. It includes images of 60 aircraft from all eras of aviation. It features full English and Japanese text, with original Japanese commentary by renowned aircraft researcher Toshio Fujita. The English translation is by HLJ's own Scott T. Hards.

The book itself is beautiful, too: hard-cover, printed on heavy gloss art paper in large, 38 x 28.5cm format. It also includes a dust jacket and a matching cardboard sleeve.

Order your copy from HLJ and we'll send you a free gift: the cardboard sleeve for his previous softcover collection, *Flying Colors 2*!

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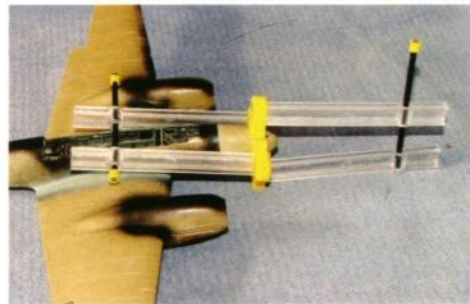




... and main undercarriage bay



Filling those gaps!



The nose and fuselage held in place whilst the glue sets

"Subsequent research would appear to indicate that S9+CK was in fact a Bf 110D-0/B..."

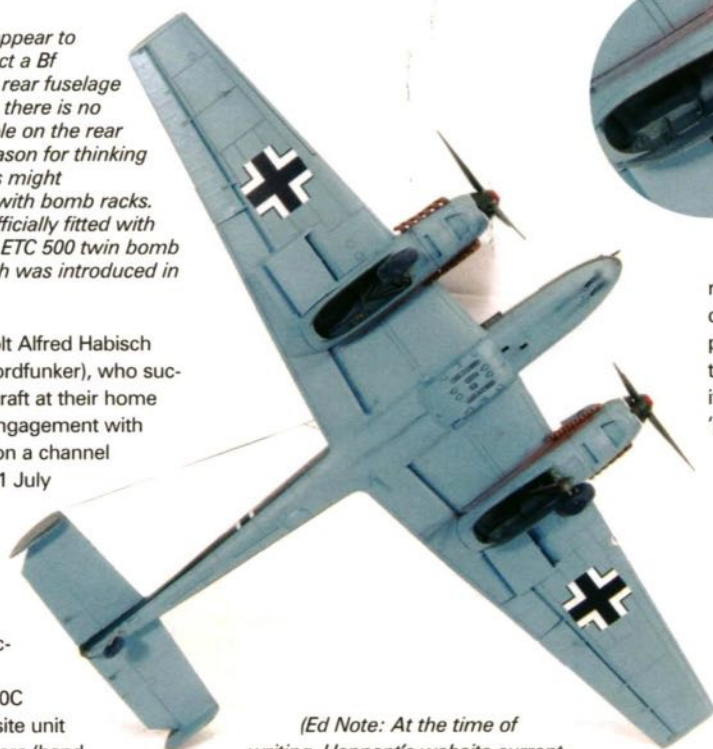
Ed Note:

Subsequent research would appear to indicate that S9+CK was in fact a Bf 110D-0/B – with the extended rear fuselage to house the dinghy, although there is no sign of the dinghy release cable on the rear fuselage, which could be a reason for thinking it might be a C, as repaired Cs might occasionally have been fitted with bomb racks. However, no Bf 110Cs were officially fitted with the central fuselage-mounted ETC 500 twin bomb rack until the C-7 variant which was introduced in late 1940.

S9+CK was crewed by Oblt Alfred Habisch (pilot) and Uffz Ernst Elfner (bordfunker), who successfully crash-landed the aircraft at their home base at Denain following an engagement with RAF fighters after an attack on a channel convoy on the afternoon of 21 July 1940. It is also possible that the individual aircraft 'C' was black...

Xtracrylix paints were used throughout, all three colours being sprayed on successfully.

The Eduard kit of the Bf 110C does not come with the requisite unit markings, so the unit codes were 'hand made' on my computer, although anyone with a reasonably well-stocked decal bank should be able to cobble something suitable together.



(Ed Note: At the time of writing, Hannant's website currently lists several 1/48 scale decal sheets for the Bf 110C/D from the likes of Eagle Cal, Owl Decals and Techmod).

Being a 2 Staffel machine, the individual aircraft letter 'C' would most likely have been red, so this is how it was printed and

the propeller spinner tips were also painted red. The black codes worked well, the red not so well. In the end, I had to use a white 'C' from another source for backing. A couple of coats of gloss varnish sealed and bedded them in and a couple of coats of Xtracrylix Matt Varnish completed the painting/decalling job.

The smaller touches were now added – such as the rear gunner's MG for example. I didn't, as the instructions suggest, add the gun-sight to the central post – it should be added to the end one.

The canopies were added using Formula 560, a really 'grippy' clear glue specifically designed for clear parts. All these fitted as designed. I used the plastic DF loop as this is a far better 3D representation of the original than the photo-etched 2D item supplied. A touch of weathering from the 'pastel dept' and it was done.

Overview

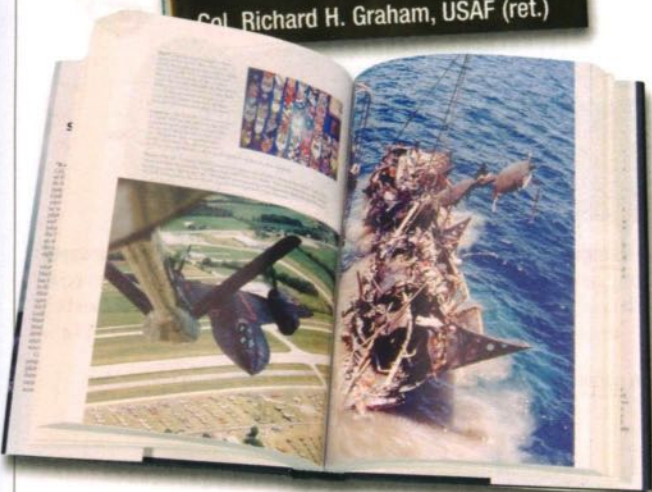
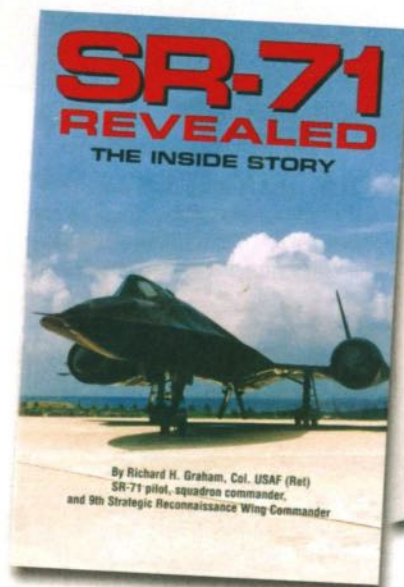
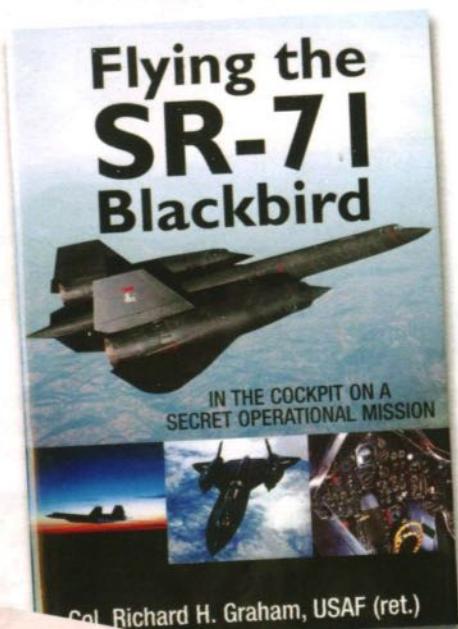
Well, Eduard have done it again. They've given us a superb replica of this aircraft at a reasonable price and then proceeded to make the kit as hard as possible to build! The detailing included must have been done by Eduard's top designer, the fit of parts by the cleaner's apprentice... How they could have got the nose and wings so wrong, I really don't know.

Nevertheless, if you have a reasonable level of modelling skill, the patience of a saint and a good supply of tools and files, then your effort should turn out okay. It knocks the old Fujimi kit into a 'cocked hat', so, even with its 'problems', I'm going to build some more.

Not right now of course, maybe later... much later...! **MARK**



Win this SR-71 Blackbird trilogy



Richard H. Graham

Signed by
Colonel Richard H Graham
in association with Zenith Press

All you have to do to have the chance to win this exclusive set of books, is answer the following three questions...

- Q** 1 At which RAF base in the UK did the 9th Strategic Reconnaissance Wing operate its SR-71s from?
- Q** 2 What is the SR-71's quoted maximum Mach number speed ?
- Q** 3 What was the Japanese word for a poisonous snake found on Okinawa used to describe the SR-71?

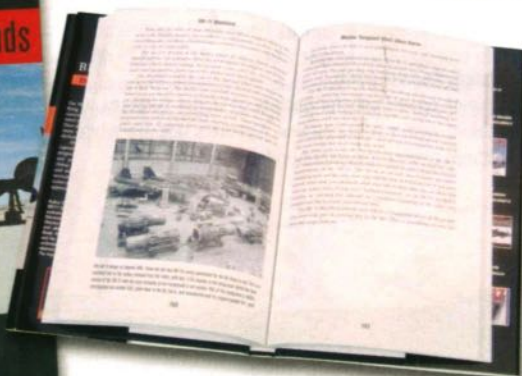
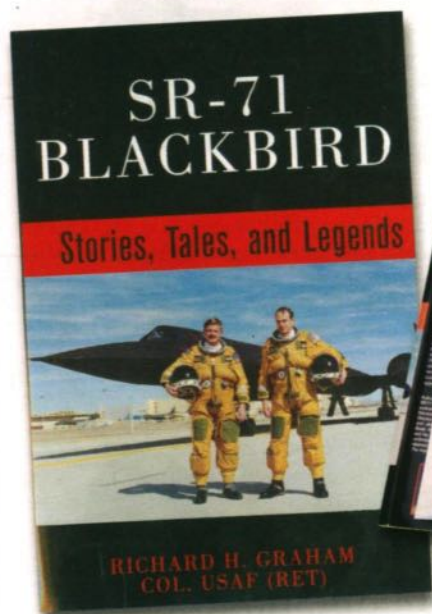
Send your answers on a postcard to:

SR-71 Competition

SAM Publications

Media House, 21 Kingsway, Bedford, MK42 9BJ, UK

Entries to arrive not later than 1 July 2009



Competition Rules

Employees/volunteers working for SAM Publications, Zenith Press and associated companies or their families are not permitted to enter. The first correct entry drawn will win. Entries are limited to one per person/household. No correspondence will be entered into. The judges' decision is final. The winner's name will be published in a future edition of Model Aircraft Monthly. All entries must reach SAM Publications by 1 May 2009, when the prize draw will take place.

**Messerschmitt Bf 110C-1, L1 + IH of 1.(Z)/LG 1, Jesau, East Prussia, September 1939**

Standard RLM 70 Schwarzgrün (black green) and RLM 71 Dunkelgrün (dark green) splinter pattern on upper surfaces with RLM 65 Hellblau (light blue-grey) undersides. Code letters in black and spinner tips in white. Note the early style narrow bordered Balkenkreuz on the fuselage sides. One 'kill' marking on nose for a Polish P.7 fighter. The 'wolf' marking on nose is in RLM 26 Braun (brown) with a white background black eye and a RLM 23 Rot (red) tongue

**Messerschmitt Bf 110D-0, M8 + SL of 3./ZG 76, Denmark, spring 1940**

Standard RLM 70 Schwarzgrün (black green) and RLM 71 Dunkelgrün (dark green) splinter pattern on upper surfaces with RLM 65 Hellblau (light blue-grey) undersides. Code letters in black with individual aircraft letter 'S' in RLM 04 Gelb (yellow)

**Messerschmitt Bf 110C-6, S9 + RH of 1./Erprobungsgruppe 210, France, August 1940**

Standard RLM 70 Schwarzgrün (black green) and RLM 71 Dunkelgrün (dark green) splinter pattern on upper surfaces with RLM 65 Hellblau (light blue grey) undersides. Code letters in black with individual aircraft letter 'R' in RLM 24 Blau (blue) with a white outline. Spinners tips are white. Unit marking is a white shield with a red map of England over which is superimposed a gun sight in yellow. Note the 30mm cannon mounted under the nose.

**Messerschmitt Bf 110D-1/R-1, M8 + AL of 3./ZG 76, Stavanger, August 1940**

Standard RLM 70 Schwarzgrün (black green) and RLM 71 Dunkelgrün (dark green) splinter pattern on upper surfaces with RLM 65 Hellblau (light blue-grey) undersides. Code letters in black with individual aircraft letter 'A' in RLM 04 Gelb (yellow). Spinners are RLM 70 Black Green (Schwarzgrün) with tips in RLM 27 Gelb (yellow)


Messerschmitt Bf 110C-4, M8+DN of 5./ZG 76, Luftflotte 3, Abbeville-Yvrench, France, August 1940

Standard RLM 70 Schwarzgrün (black green) and RLM 71 Dunkelgrün (dark green) splinter pattern on upper surfaces with RLM 65 Hellblau (light blue-grey) undersides. Code letters in black with individual aircraft letter 'D' in RLM 23 Rot (red) with a white outline. Spinner tips in RLM 23, as was the 'sharkmouth' on the nose with white teeth.


Messerschmitt Bf 110C-2, A2+BB of Stab I./ZG 52, France, September 1940

Repainted in the RLM 71 Dunkelgrün (dark green) and RLM 02 Grau (grey-green) splinter scheme pattern on upper surfaces with RLM 65 Hellblau (light blue-grey) under surfaces and fuselage sides. Code letters in black with individual aircraft letter 'D' in RLM 25 Grün (green) with a white outline. Spinner tips in RLM 25. Emblem on nose is a black shield outlined in white with a white dragon with red claws


Messerschmitt Bf 110E of 4./ZG 76, 'Sonderkommando Junk', based at Mosul, Iraq, May 1941

Standard RLM 74 Dunkelgrau (dark grey) and RLM 75 Grauviolett (mid grey) splinter scheme pattern on the upper surfaces with RLM 76 Lichtblau (light grey-blue) under surfaces and fuselage sides. Fuselage sides mottled with RLM 74/75. Original national markings and unit codes overpainted possibly in fresh RLM 76, and RLM 74/75 on the wing upper surfaces. Top part of nose and spinner tips in white. Engine cowlings are in RLM 04 Gelb (yellow). Iraqi air force triangle insignia applied in six positions, also in vertical stripes across the outer faces of the fins and rudders, in green, white, red and black. ZG 76's sharkmouth is in red with white teeth


Messerschmitt Bf 110C-5, L2+NR of 7.(F)/LG 2, Norway, early 1941

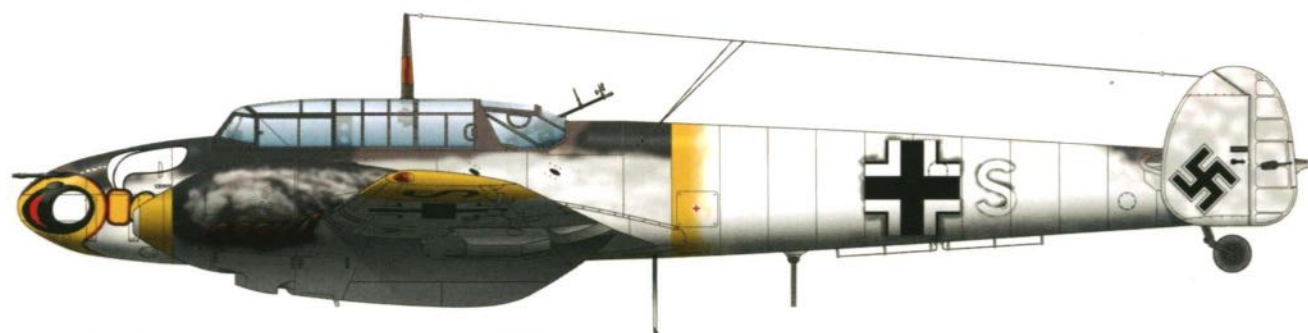
RLM 71 Dunkelgrün (dark green) and RLM 02 Grau (grey-green) splinter scheme pattern on upper surfaces with RLM 65 Hellblau (light blue-grey) under surfaces and fuselage sides. Code letters in black with individual aircraft letter 'N' in white. Spinner tips in white, RLM Gelb 27 (pale yellow) nose and rudders. Unit emblem on nose is red, white and black with the background of the face and ears in silver.


Messerschmitt Bf 110E-1, 3C+EN of 2./NJG 4, February 1941

Overall RLM 66 Schwarzgrau (black grey). Codes are in RLM 77 Hellgrau (light grey), with the individual aircraft letter 'E' in RLM 23 Rot (red) outlined in white. Sharkmouth is also in RLM 23. Letter 'N' on engine cowling, (denoting DB 605N engine fitted), is in white. The 'Englandblitz' unit emblem is a black shield bordered in white with a blue map, a red lightning flash and a white diving eagle. Note the flags of the countries which the aircraft had operated over under the port fuselage cockpit glazing – from left to right: Belgium, France, Holland, Greece, Iraq, Yugoslavia, Finland and Denmark – see enlargement above


Messerschmitt Bf 110E-2, G9+BC of Stab II./NJG 1, February 1941

Overall RLM 66 Schwarzgrau (black grey). Chevron and codes are in RLM 77 Hellgrau (light grey). Spinner tips in RLM 25 Hellgrün (light green). Unit marking is a black and white shield with red and black squares. The emblem in the centre is white


Messerschmitt Bf 110C-4/B, S9+SH of 1./SKG 210 Russia, late 1941

Standard RLM 74 Dunkelgrau (dark grey) and RLM 75 Grauviolett (mid grey) splinter scheme pattern on the upper surfaces overpainted with a wash of white distemper. RLM 76 Lichtblau (light grey-blue) fuselage sides and under surfaces – fuselage sides mottled with RLM 74/75 overpainted with white distemper also partially covering the RLM 27 Gelb (yellow) Eastern Theatre i/d band. Unit code letters overpainted in white distemper just leaving the individual aircraft letter 'S' in white. RLM 04 Gelb wingtips with black code letter. RLM 04 spinners with white tips. Stylised wasp marking on nose has yellow body and white wings, red eye, all outlined in black


Messerschmitt Bf 110E-2, 3U+AC of Stab II./ZG 26, Smolensk, January 1942

Standard RLM 74 Dunkelgrau (dark grey) and RLM 75 Grauviolett (mid grey) splinter scheme pattern on the upper surfaces with 'squiggle' disruptive line pattern in RLM 77 Hellgrau (light grey). RLM 76 Lichtblau (light grey-blue) under surfaces and fuselage sides. Code letters in black with individual aircraft letter 'A' in RML 25 Hellgrün (green). Eastern Theatre fuselage band and lower engine panels in RLM 04 Gelb (yellow). RML 25 Hellgrün spinners



Messerschmitt Bf 110D-3, L1 + BH of 1./NJG 3, Tripoli, February 1942

Created from Lehrgeschwader 3, NJG 3 used a variety of Bf 110 sub-types in the night fighter/night intruder role. L1 + BH, a D-3 with the extended rear fuselage housing a dighy, was finished in overall RLM 66 Schwarzgrau (black grey). Codes are in RLM 77 Hellgrau (light grey). White spinner tips. Note the white Mediterranean Theatre i/d panel on top of rear fuselage



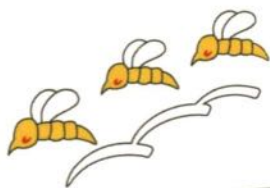
Messerschmitt Bf 110E, 3U + FR of 7./ZG 26, Derna, May 1942

RLM 79 Sandgelb (sand-yellow) upper surfaces with RLM 78 Hellblau (bright blue) undersides. Code letters in black, with individual aircraft letter 'F' in white outlined in black. White Mediterranean Theatre fuselage band and white engine cowlings, spinners and wingtips



Messerschmitt Bf 110E-2/Trop, 3U + KS of 8./ZG 26, North Africa, mid-1942

RLM 79 Sandgelb (sand-yellow) upper surfaces and fuselage sides with RLM 78 Hellblau (light blue) under surfaces. Code letters in black with individual aircraft letter 'K' and spinner tips in RLM 23 Rot (red), remainder of spinners in RLM 70 Schwarzgrün (black green). White Mediterranean Theatre fuselage band and white wingtips



Messerschmitt Bf 110C, 2N + AR of 7./ZG 26, Norway, 1942

Standard RLM 74 Dunkelgrau (dark grey) and RLM 75 Grauviolett (mid grey) splinter scheme pattern on the upper surfaces with RLM 76 Lichtblau (light grey-blue) under surfaces and fuselage sides. Fuselage sides mottled with RLM 74/75. Code letters in black with individual aircraft letter 'A' in white. Spinners are RLM 70 Schwarzgrün (black green) with white tips. Emblem on nose (enlarged above) comprises three yellow wasps with red eyes and white wings over a symbolic cloud

IPMS(UK) Column



Hello again! As mentioned last month, one of the purposes of this feature is to report on the various Society model shows – but the ones which I'd hoped to provide reports on in this issue have not yet happened yet due to the magazine's lead-in time! Oh well, c'est la vie...

However, another major advantage and benefit of IPMS membership is the extensive Branch network, which encourages modellers to get together and share a common interest. (A UK Branch is the equivalent of a 'Chapter' elsewhere in the world).

There are presently over 70 local IPMS Branches scattered around the UK, plus a number that are internet based. Meetings are held in village halls, scout huts, the back rooms of local pubs etc – Bridlington & Wolds even hold theirs in the old Station Buffet at Bridlington Railway Station!

Most groups meet monthly,

although there are exceptions which meet more often, and the opportunity to share experiences and learn from others is much valued. Equally important though, is the social aspect. Even if you rarely finish a model, the friendship and camaraderie of mutual interests are very encouraging.

Branch meetings are invariably 'open to all' and are welcoming to newcomers. If you are not currently an IPMS member but would like to share your hobby, why not visit your local Branch and see what it's all about? Most IPMS (UK) Branches and associated model clubs do not insist on IPMS membership – although this is, of course, encouraged – and many have a mixture of members and non-members.

Bear in mind that the only qualification you need to join us is an interest in model-making. The standard of your modelling skills is irrelevant and



A themed display at SMW 2008

you will find members of all skill levels only too willing to learn from you as much as offering advice to you. Mainly though, you will enjoy the friendliness, enthusiasm and encouragement of like-minded people.

I've provided a list of all of the current IPMS (UK) Branches, courtesy of Rob Monfea, IPMS (UK) Branch/SIG Liaison Officer. The contact point is usually the local Branch Secretary and contact details can be found on the IPMS (UK) website at www.ipms-uk.co.uk/branches

Alternatively, please drop Rob an e-mail at ukliaison@gmail.com

IPMS members reading this will already be aware of most of the above plus another aspect of Branch membership – 'Branch Displays', which are seen at model shows throughout the country. These are an integral part of the modelling 'scene' and offer a great opportunity to present your hard work to a wider audience.

There is a lot of satisfaction to be had from this... particularly if your 'other half' doesn't seem to appreciate your efforts as much as she should! Many clubs provide a general display of models at the various shows throughout the year and often work towards a themed presentation at Scale ModelWorld held at Telford each November.

So, that brings me to the show calendar. May is particularly busy in the southern part of the country for some reason... however the Potteries Model Show, held at Meir Community and Education Centre, Stoke-on-Trent on the 10th, is the exception. This is a small (cosy) but very popular event with a number of traders and a friendly atmosphere. This year an additional inspiration to entering the competition is a prize of £150 of model vouchers for the Best in Show winner.

On the same day, IPMS Gloucester hold their 9th Annual show at The Churchdown Community Centre. Easy to get to, just off the A40 close to Junction 11 of the M5, the proximity to Gloucestershire Airport (Staverton) might be an encouragement to those of you with an interest in light 'civvies'.

Saturday 23rd of May sees the IPMS Torbay/South Devon (Torbay Military Modelling Society) Annual Show, held at Torquay Town Hall. I must admit to not knowing very much about this one but it is their 38th (!) so I guess that says quite a lot. Doors open at 9.30am.

The last weekend of the month (30th - 31st) has a couple of shows. On Saturday, IPMS Salisbury hold their Annual Model Show and Competition at Wyvern College in Laverstock. There will be over 45 Clubs, SIGs and Traders, an open competition plus refreshments and tombola, together with free on site parking. Open 9.30am to 4.30pm.

Sunday sees the Hendon Scale Model Show, organised by IPMS Barnet and IPMS Harrow and held at the RAF Museum, Hendon. A great venue with free admission and parking. Doors open 10am - 6pm. If you need any further motivation to visit this show, nearby Hannants of London will be open for the day.

Finally, a quick reminder to all current members that the Society's Annual General Meeting is being held on Saturday 16th May, commencing at 1pm. The venue is the wonderful Yorkshire Air Museum at Elvington near York. Entry to the museum is free but entry to the AGM will require production of your IPMS Membership Card!

Chris Ayre
IPMS(UK)
www.ipms-uk.co.uk

CURRENT IPMS (UK) BRANCHES

Abingdon
Avon
Barnet
Belvoir
Bolton
Bridlington & Wolds
Chiltern
Cleveland
Derby City
Devon North
Dorset
Earley Risers
Edinburgh
Farnborough
Glasgow
Harrow
Ipswich
Kent
Leicestershire
Lincoln
London - South East
Mercia
Mid-Sussex
Nene Valley
Newark
Northern Ireland
Cars & Motorcycles
Quarter Scale Group (Nuneaton IPMS)
Runcorn (Riverside Modellers)
Salisbury
Somerset - North
IPMS South Lincs Association of Modellers
Staffordshire Moorland Models
Telford
Tyneside
Wallingford
West Cornwall
West Norfolk (Kings Lynn)
Wirral

Air Cadets - Dorset & Wiltshire
Avro Lancashire
Barnsley
Birmingham
Brampton
Britmodeller
Clacton
Coventry/Warwickshire
Derby & District
Devon - South/Torbay
Dundee
East Neuk
Essex - South East
Fenland
Gloucester
Hornchurch
Keighley
IPMS Kitmaker
Les Garagistes
London
Manchester
Merseyside
Milton Keynes
Newbury
Norfolk
Northwest
Portsmouth
Rotherham
Rutland
Sheffield
Southampton
Stafford
Swindon
Thames Valley
Wakefield & District
Warrington
West Glamorgan
West Riding (Leeds)
York and North Riding



Canberra B.15, WJ762 of No 73 Sqn, of the Akrotiri Wing, early 1960s, finished in the Dark Green/Dark Sea Grey and High Speed Silver scheme. Note the squadron badge on the fin and the discharged rocket pod under the wing (Glenn Sands)

AIRFILE

PART
13

Canberra Bombers for the RAF

B.2, B.6, B(1).6 B.15 and B.16 1951-1970

Paul Lucas looks at the camouflage and markings of the Canberra B.2, B.6, B(1).6, B.15 and B.16 in front-line RAF service

The English Electric Canberra holds the double distinction of being both the first jet bomber to be produced in Britain and the first to serve with the RAF. Designed to Specification B.3/45 the first prototype, VN799 first flew at Warton on 13 May 1949.

VN799 was finished in an overall blue scheme which was apparently known colloquially as 'Petter Blue' after the Canberra's designer, W E Petter. The exact identity of this shade of blue currently remains unknown, but it is possible that it was in fact PRU Blue. National markings consisted of 36 inch diameter 1-2-3 proportioned Bright Red, White and Bright Blue roundels on both sides of the fuselage and a 24 inch square flash on the fin with no national markings being applied to the upper or under surfaces of the wings. The aircraft's serial number was applied in White characters 48 inches high under the wings and 8 inches high on the rear fuselage. In addition to these markings, a 'P in a circle' prototype marking of 36 inches diameter was carried aft of the fuselage roundel on both sides of the fuselage. Very few other markings appear to have been carried with the airframe stencilling, which became common to later Canberras, apparently being absent.

The second, third and fourth prototypes, VN813, VN828 and VN850, which made their first flights in November and December 1949, were all finished in the prevailing Bomber Command camouflage scheme of the time which consisted of Medium Sea Grey on the upper surfaces and Anti-Searchlight Glossy Black on the under surfaces to Pattern No 2. These aircraft were marked similarly to VN799 as described above but with the addition of 84 inch diameter 1-2-3 proportioned roundels in the usual colours to the upper surfaces of the wings.

All these aircraft retained the solid nose of the first prototype as the Canberra had been designed to use a radar system in order to aim its bombs. By 1947 however, it had become apparent that the projected radar bombing system would not give satisfactory results and the Canberra was subsequently redesigned to use traditional visual bomb aiming techniques by the addition of a transparent nose and an additional third crew member. Therefore the fifth prototype, VX165, became the prototype Canberra B.2, to Specification B.5/47, and made its first flight on 23 April 1950 finished identically to the previous three prototypes as described above.

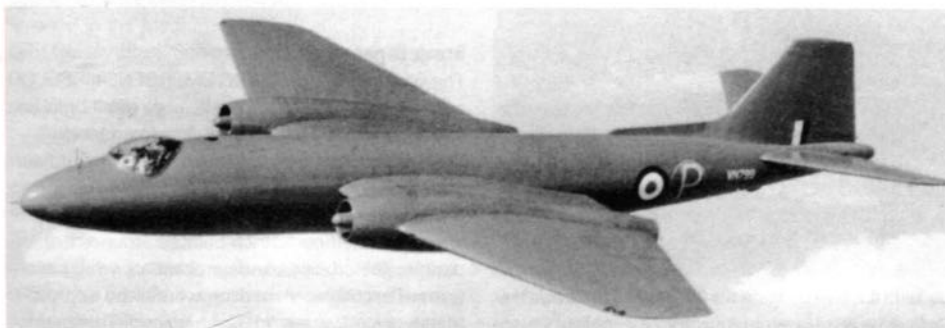
Canberra B.2 enters service

The first production batch of Canberras was ordered from English Electric in March 1949 with the first production aircraft, WD929, making its first flight on 8 October 1950 and the first Canberra B.2s entering service with 101 Sqn at Binbrook in May 1951. Like the four prototypes before them, these Canberras were delivered finished in the camouflage finish then laid down for Bombers which had both a day and night role, of Medium Sea Grey upper surfaces and Anti-Searchlight Glossy Black under surfaces to Pattern No 2.

This camouflage scheme had originated as a result of a conference held at the Air Ministry in October 1945 to set the post-war aircraft camouflage and markings policy for the RAF and the Fleet Air Arm. Prior to this conference a debate had been taking place within Bomber Command for some time as to the most effective form of camouflage for its Heavy Bombers. There is no space to describe these deliberations in any detail here and this short synopsis will have to suffice.

Some experimental work had been carried out by the Bomber Development Unit in 1943 which indicated that Night Bombers would be less easily picked up by Fighters if their upper surfaces were painted in a lighter colour, preferably a greenish grey, but nothing had been done to implement any change to the extant production Dark Green/Dark Earth Temperate Land Scheme.

The question of a more effective camouflage scheme for Bomber Command aircraft seems to have been brought to a head by a letter dated 13 January 1945 from the Under Secretary of State for Air at the Air Ministry to all Commands at home and overseas. The letter informed the Commands that the Air Ministry had the camouflage of aircraft under review in the light of changed operational conditions, and the easing in manpower and material which would result if aircraft were supplied in an uncamouflaged state.



The prototype Canberra VN799 in overall 'Petter Blue', pictured on a test flight from Warton following modification to the rudder. Note the yellow prototype 'P' in a circle marking and the lack of upper wing roundels

On the operational side, it was suggested that Allied air superiority was such that the risk of operating certain types in an uncamoouflaged state was acceptable as far as aircraft in the air were concerned. On the other hand, uncamoouflaged aircraft, particularly the larger types, would show up very clearly on the ground.

It was stated that there would undoubtedly be a saving in material and manpower if aircraft were acceptable without camouflage. Provision of dopes, paints, and accessories for finishing would be unnecessary. A considerable amount of filling and stopping, however, was required to provide and maintain an aerodynamic finish, and this would require considerable care and experience. Provided this filling and stopping was maintained in service, it was thought unlikely that the difference in performance between camouflaged and uncamoouflaged aircraft would be appreciable.

It was noted that a number of uncamoouflaged aircraft had then been in service for some considerable time, and the Air Ministry requested the Commands' views as to whether they were acceptable in this state from the operational and maintenance points of view. An opinion was also requested on which types should remain camouflaged, eg Night Bombers and General Reconnaissance.

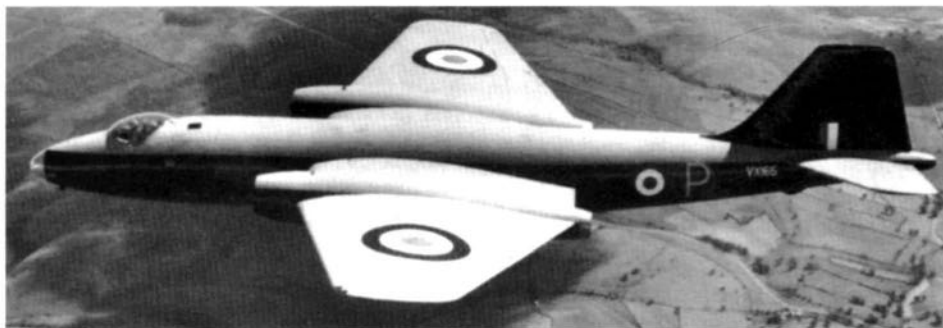
The question of the future camouflage of Bomber Command aircraft was placed before Bomber Command's Senior Air Staff Officer on 19 January 1945, with the opinion that whilst Bomber Command was still engaged on night operations it was considered unwise to give up a camouflage finish on any operational Bomber aircraft. It was suggested, however, that it would be possible to dispense with the two-colour disruptive pattern on the upper surfaces in favour of a single colour which should be a dark grey or green, preferably with a gloss finish.

It was suggested that the under surfaces for Heavy Bombers should remain black, but here again, a glossy finish was recommended. Following research in the United States which indicated that a high gloss black finish was more effective in delaying searchlight pickup than a matt black finish, an operational trial was carried out on a batch of fifty Rootes-built Halifax B.IIs during late 1944. These trials were considered to be very successful and this would ultimately lead to the adoption of a gloss black finish for the under surfaces of RAF Heavy Bombers which was known as Anti-Searchlight Glossy Black. The new finish, initially produced by ICI, was included in AP 2656A by Amendment List No 21 in May 1945.

An internal Air Ministry memo dated 2 April 1945 summarised the responses of the operational Commands to the Air Ministry letter of 13 January. All Commands agreed that heavy Night Bomber aircraft should retain a camouflage finish and noted that Bomber Command was prepared to accept a single colour in place of the existing two colours on the upper surfaces of its aircraft. This still appears to have been Bomber Command's position at the time of the camouflage policy conference in October 1945, which saw the two-tone grey and black scheme formally adopted. This policy was set for a period of five years with the provision that it would become subject for review after four years.

Camouflage and Marking regulations

At the time that the Canberra B.2 entered production the camouflage and marking requirements for



Canberra B.2 prototype, VX165, in the Medium Sea Grey upper surface with Anti-Searchlight Glossy Black under surface scheme. Note the yellow prototype 'P' in a circle marking and how the medium Sea Grey extends all the way to the tip of the nose

Bombers with both a day and night role were set down in three documents. The regulations regarding the camouflage and marking of RAF aircraft were laid down for the aircraft manufacturing industry in Air Publication (AP) 970 entitled 'Design Requirements for Service Aircraft' and for the Service in AP 2656A which was entitled 'Internal and External Finish of Aircraft'. Both of these documents were regularly updated to reflect the latest service requirements by the issue of Amendment Lists (AL).

The latest camouflage and marking requirements were promulgated to the Service by the issue of Air Ministry Orders until the amalgamation of the three service Ministries, the Admiralty, War Office and Air Ministry, into the Ministry of Defence (MoD) in 1964. From this time on, the instructions were passed by Defence Council Instructions (DCI). The usual practice was for any change in the camouflage and marking requirements of service aircraft to be promulgated to the Service by the issue of an AMO, following which an Amendment List would be issued which would then be embodied in the relevant Air Publication.

AP 970

To guide aircraft manufacturers in the design of a camouflage scheme for their aircraft, AP 970 contained a number of monotone illustrations of which the following are relevant to us here.

Fig 1 showed the disruptive pattern to be applied to a single-engined monoplane, which bore a passing resemblance to a Hurricane, as a series of shaded and unshaded areas. The camouflage pattern was that of the 'B' scheme from the wartime Air Diagrams

Fig 2 showed the disruptive pattern to be applied to a twin-engined monoplane, which bore a passing resemblance to a Mosquito, as a series of shaded and unshaded areas which was also that of the 'B' Scheme of the wartime Air Diagrams.



Canberra B.2, WD937, one of the first production batch in the Medium Sea Grey upper surface with Anti-Searchlight Glossy Black under surface scheme to pattern No 2, which was applied to the early production Canberra B.2s

Fig 5 showed the demarcation line between the upper and under surface colours to Pattern No 1 which was low down on the fuselage side.

Fig. 6 showed the demarcation line between the upper and under surface colours to Pattern No 2 which was high up on the fuselage side.

AP 970 Chapter 108 Amendment List 47 dated 1 March 1950 stated that Night Bombers or aeroplanes with a day and night bombing role were to be painted as follows:

- (i) Upper Surfaces - Medium Sea Grey
- (ii) Under Surfaces - Glossy Black. (Specification number DTD 768 or 785 for cellulose finishes or DTD 796 for synthetic finishes.)
- (iii) Boundary between upper and under surfaces - Pattern No. 2 as shown in Fig 6.
- (iv) Spinners - Medium Sea Grey.

Whilst the Canberra did not have spinners, this description accurately describes how the first production Canberra B.2s were camouflaged.

The national markings applied to the Canberra B.2 consisted of 1-2-3 proportioned Bright Red, White and Bright Blue-roundels of 84 inches diameter on the upper surfaces of the mainplanes and 36 inches diameter on both sides of the fuselage along with a fin marking 24 inches square. No roundels were applied under the mainplanes.

Serial numbers were applied to the under surfaces of the wings in 48 inch high White characters with the letters outboard on each wing in the usual manner which allowed the serial number to be read both from in front of and behind the aircraft when viewed from below. The serial number was repeated in 8 inch high White characters on both sides of the rear fuselage just forward of the tailplane.

Airframe stencilling

Airframe stencilling was covered by AP 970 Chapter 107 'Operational markings'. According to AL 44 dated 1 February 1949 the external markings were to be as follows:

Break-in panels

The words 'CUT HERE FOR EMERGENCY RESCUE' were to be stencilled on the outside of all break-in panels. The letters were to be approximately 1 inch high. All such panels were to have in addition to this marking a broken band consisting of segments approximately half an inch wide and 1 in long separated by 12 inch painted around their periphery. Horizontal and vertical bars which formed each corner marking were to be approximately 1 inch wide and 3 inches long. This band was intended to indicate where, if so necessary, rescuers would have to cut in order to force entry.

The control operating each such panel was to be coloured and operating instructions were to be applied in simple terms in the immediate vicinity. In painting these markings the colours were to be chosen so that the markings stood out from the surrounding surfaces.

Entrance doors and exits

The controls operating entrance doors and exits other than those referred to above were also to be clearly marked and coloured so as to stand out from the surrounding surfaces with simple operating instructions applied in the near vicinity. On the Canberra there was even a notice often applied to the port side of the nose that the entrance was on the other side!

On the Medium Sea Grey and Anti-Searchlight Glossy Black scheme, Yellow appears to have been the colour of choice for the break-in panels and entrance doors and exits which were coloured black. Yellow may also have been used on the Medium Sea Grey upper surfaces, but if this was the case, the markings do not stand out in photographs, so it is possible that such markings were not applied around the base of the canopy or around the navigator's station on top of the fuselage. Yellow was also used for the prominently marked fire extinguisher and axe markings applied to the starboard side of the fuselage adjacent to the entrance hatch.

Fire access panels

Fire access panels in the engine cowlings were to be marked with the words 'FIRE PANEL' in red letters approximately 1 inch high.

Ejection Seats

Aircraft fitted with ejection seats were to be marked in suitable positions on the fuselage by a red equilateral triangle with 9 inch sides and apex pointing downwards with 'DANGER' printed (clockwise) on each side of the triangle and 'EJECTION SEAT' printed in white inside the triangle. A red arrow was to indicate the ejection seat handle where this could simplify the meaning of the marking.



Canberra B.2s of No 101 Sqn in the Medium Sea Grey/Anti-Searchlight Glossy Black scheme. This photograph provides an excellent illustration of how anonymous No 101 Squadron's Canberras were when they first entered service

The ejection seat warning triangles do not appear to have been applied to those Canberras finished in the Medium Sea Grey and Anti-Searchlight Glossy Black Scheme when they left the production line, though it is possible that some aircraft had them applied subsequently.

Although not mentioned in the documents referred to above, these early Canberras had wing walkway markings applied to the upper surfaces of the mainplanes in the form of a black broken line made up of segments which were approximately three inches long by one and a half inches wide. This broken line extended out from the wing root near the trailing edge following the flap line as far as the aileron. The line then followed the aileron to its outboard edge before turning to fol-



Canberra B.2s of No 101 Sqn, Binbrook in the winter of 1951/52, in the Medium Sea Grey/Anti-Searchlight Glossy Black scheme. Note the prominent wing walkway markings on the Canberra in the foreground. In the background can be seen one of the squadron's Lincolns carrying the squadron codes (SR-B) which were conspicuously absent from the Canberras

low the wingtip and returning towards the fuselage along the main spar. Having crossed the engine nacelle, the walkway line then ran to the leading edge of the wing just inboard of the engine nacelle.

WD929 was followed by a further forty-three aircraft finished in the Medium Sea Grey and Anti-Searchlight Glossy Black scheme with WD986 being the last Canberra B.2 delivered in this scheme before a change in camouflage policy saw a new camouflage scheme introduced.

Camouflage policy review begins

When the decision was taken to adopt the grey and black scheme for bombers in 1945, the policy thus set was expected to last for five years but to be subject to review after four years. This review appears to have begun in July 1949 when some question appears to have been raised regarding the colour scheme being applied to the Canberra.

On 14 July 1949 the Director of Operational Requirements at the Air Ministry referred this question, the exact nature of which is currently unknown, to one of his staff officers in a memo which stated the matter concerned appeared to be OR1's subject. The memo then went on to comment that the prototype Canberra was, "...a lovely blue colour but the 2nd prototype looks ghastly in standard night bomber colours". Finally, the memo asked why, apart from appearances, a high-altitude bomber should be finished in standard medium-level night bomber colours. The DOR also enquired as to what work was going on to see what colour aircraft should be and what were the Air Ministry's requirements?

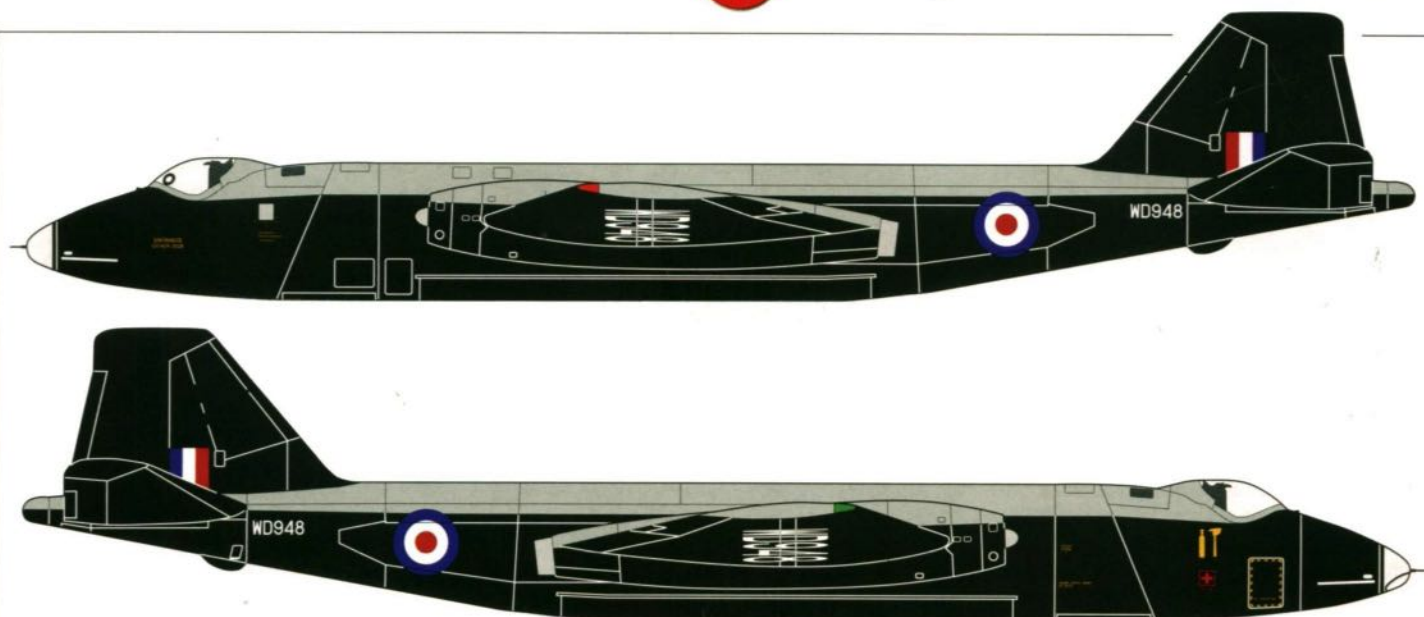
In a reply dated 18 July 1951, the OR staff informed the DOR of the origin of the current policy as outlined in AMO A.816/48 and the fact that it had been agreed that the policy would be subject of a review after a period of four years. The memo then went on to state that the Directorate of Operations had sent a letter to all Commands and other interested Directorates asking them to state their views on aircraft camouflage in the light of their

experience over the last four years. It was assumed that once all the replies had been received that a meeting would be called to discuss the RAF's future requirements.

How quickly the replies were received is not clear but it would appear that all had been received by January 1950, as on 6 February 1950 the Directorate of Operations was able to circulate a paper dealing with the review of aircraft camouflage and finishing policy. This paper set out the current camouflage policy and gave some details of the views held at that time by various interested bodies such as various branches within the Air Ministry, Ministry of Supply and operational RAF Commands.

Following a discussion which would be far too long and involved to go into in any detail here, it would appear that the review was essentially complete by the end of the summer of 1950 when a further paper was prepared which examined the various factors involved in aircraft camouflage and made recommendations for the future policy. The revised paper was circulated to the interested parties asking for their comments on 2 October 1950.

Bomber Command recommended no change in the Medium Sea Grey and Anti-Searchlight Glossy Black finish on their Bomber aircraft. Whilst for the most part the recommendation to retain the current scheme for night and day/night Bombers was thought to be reasonable, the Deputy Director of Bomber Operations at the Air Ministry suggested that some further thought might be given to the finish which was applied to Jet Bombers, (ie Canberras), as unless they were to be operated at medium or low altitudes by night, the application of Anti-Searchlight Glossy Black to the under surfaces seemed unnecessary. It was suggested that for Jet Bombers, a high-flying scheme such as Medium Sea Grey upper surfaces with PRU Blue under surfaces would be more suitable. However, it was also suggested that Marker aircraft which had occasion to fly low in the target area should retain the Anti-Searchlight Glossy Black on their under surfaces in place of PRU Blue.



English Electric Canberra B.2 WD948 of No 101 Sqn based at RAF Binbrook, Lincolnshire in 1951

Completed in October 1951, WD948 was one of the first Canberra B.2s to serve with 101 Sqn and was finished in the original camouflage scheme of Medium Sea Grey on the upper surfaces and Anti-Searchlight Glossy Black on the under surfaces to Pattern No 2



WD948 well illustrates the relatively anonymous appearance of 101 Sqn's early Canberras which did not carry any squadron markings despite the prevailing Air Ministry policy that a two-letter squadron code combination along with an individual aircraft letter be applied

Artwork ©2009 Peter Scott

In the light of this suggestion the policy review recommended that Jet Bombers should be finished on the upper surfaces in the same scheme as that agreed for Short Range Day Fighters which consisted of a disruptive scheme of Medium Sea Grey and Light Slate Grey on the upper surfaces. This was considered to provide a compromise finish which would go some way towards concealing the aircraft when seen from above against a cloud background whilst in flight, and help break up the outline of the aircraft when on the ground almost anywhere in the world, whilst PRU Blue on the under surfaces to Pattern No 2 would camouflage the aircraft against a sky background when viewed from below. An exception was made in the case of marker aircraft which should have Anti-Searchlight Glossy Black on the under surfaces.

AMO A.217/51

The outcome of the camouflage review was the publication of AMO A.217/51 on 19 April 1951 which superseded AMO A.816/48. The new regulations were to come into force immediately applying to those RAF aircraft on the production line and to those which required refinishing in the normal course of servicing, though it was noted that there might be some delay before all the finishes became available to units.

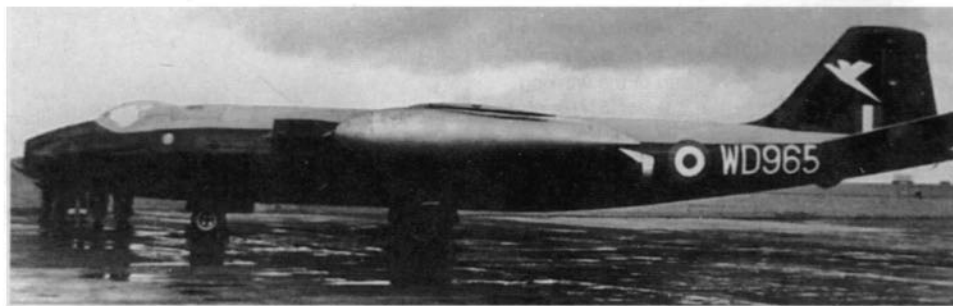
Paragraph 4 was headed 'Jet Propelled Bombers' and stated that all aircraft were to be finished in the high gloss finishing scheme with their upper surfaces coloured Light Slate Grey and Medium Sea Grey and their under surfaces coloured PRU Blue to Pattern No 2. An exception was made for marker aircraft which were to have black on their under surfaces instead of PRU Blue.

Revised Canberra camouflage

At the same time that AMO A.217/51 was issued, AP 2656A was revised to include the new camouflage schemes, whilst the aircraft manufacturers were informed of the changes by DARD Technical Circular No 8 Issue 3 towards the end of July 1951 with AP 970 'Design Requirements for Service Aircraft' being amended in the light of the new policy at the start of August 1951.

The instructions for the application of the camouflage schemes for various types of aircraft were given in Section 2 'Colour Schemes' and for Jet Propelled Bombers in paragraph 2.2.2 as follows.

"2.2.2 Jet propelled bombers. - All jet propelled bomber aeroplanes (except target marker aeroplanes which will have the under surface black) shall be painted with a high gloss finish, as



Canberra B.2, WD965 of No 10 Sqn, of the Honington Wing, in the Medium Sea Grey upper surface with Anti-Searchlight Glossy Black under surface scheme

follows:-

(i) Upper surfaces:-

(a) unshaded areas ... Light Slate Grey

(b) shaded areas ... Medium Sea Grey

(ii) Under surfaces ... PRU Blue

(iii) Boundary between upper and under surfaces Pattern No 2 as shown in Fig 6"

Section 3 was headed 'Patterns' and stated that on those aircraft for which a disruptive pattern was required, the appropriate diagram given as Fig 1 or Fig 2 should be used. As a twin-engined monoplane, the Canberra clearly had its disruptive pattern of Light Slate Grey and Medium Sea Grey on the upper surfaces applied to the pattern shown in Fig. 2 with the unshaded areas of Fig 2 being applied correctly in Light Slate Grey and the shaded areas applied in Medium Sea Grey. The PRU Blue under surfaces were also correctly applied in accordance with Fig 6 to Pattern No 2.

The Canberra's camouflage was changed to the new Light Slate Grey, Medium Sea Grey and PRU Blue scheme at English Electric by Mod 312 dated 18 August 1951. The paints used were to DTD 772 High Gloss Finishing Scheme, and the first Canberra to be completed in the new scheme was WD987 which was complete and awaiting collection from the manufacturers on 2 March 1952.

The national markings applied to Canberra B.2s camouflaged in this new scheme remained unchanged from the previous scheme with the 1-2-3 proportioned Bright Red, White and Bright Blue roundels of 84 inches diameter on the upper surfaces of the mainplanes, 36 inch diameter roundels on both sides of the fuselage along with the 24 inch square fin marking being retained.

The serial number presentation also remained unchanged being applied to the under surfaces of the wings in 48 inch high White characters with the letters outboard on each wing and repeated in

8 inch high White characters on both sides of the rear fuselage just forward of the tailplane.

Besides English Electric, the Canberra was also put into production by Handley Page, Avro and Shorts as part of Britain's crash rearmament programme which followed the outbreak of the Korean War in June 1950. The first twenty of sixty Handley Page-built Canberras, serial numbers WJ564-WJ603 which were completed between March and August 1953, and a few Avro-built Canberras beginning with WJ971 which was ready for collection on 27 February 1953, were also finished in the Light Slate Grey, Medium Sea Grey and PRU Blue scheme.

Unfortunately, the exact number of Avro-built Canberras finished in this scheme before it was superseded are not known. Even less is known of the situation at Shorts, but it is thought to be similar to that at Avro with very few Shorts-built Canberras receiving the scheme. Photographic evidence suggests that the camouflage patterns which were applied to all of these Canberras were correctly applied, with the works drawings used in each case being based on the English Electric originals.

With the introduction of the Medium Sea Grey, Light Slate Grey and PRU Blue scheme the colour of the airframe stencilling as described above appears to have been changed from Yellow to Black with an ejection seat warning triangle now making an appearance on the starboard side of the fuselage near the entrance door. This triangle appears to have been of a somewhat unusual design. It appears to have been made up of a thin red outline with the word 'DANGER' running around the edges in the usual manner and the words 'EJECTION SEAT' appearing in White on a central PRU Blue background. A broken Black line was now applied around the base of the pilot's canopy and around the navigator's station on the upper surface of the fuselage, though no ejection seat warning triangles were marked adjacent to this latter position. The wing walkway marking remained as described above.

As far as is known, no Canberras ever received the 'marker aircraft scheme' of Light Slate Grey and Medium Sea Grey on the upper surfaces and Black on the under surfaces. Whether this was due to the fact that there were judged to be sufficient Canberras in service with the earlier Medium Sea Grey and Anti-Searchlight Glossy Black scheme to meet this requirement, should they be needed in the Marker role, is not known.

A further revision

No sooner had the new Medium Sea Grey, Light Slate Grey and PRU Blue scheme been adopted for the Canberra B.2 than Bomber Command underwent a change of heart with regard to the effectiveness of the new scheme.



Canberra B.2, WF890 in the Medium Sea Grey and Light Slate Grey upper surface and PR Blue under surface scheme to Pattern No 2, photographed on the production line at Salmsbury in 1952. This photograph clearly shows the stencilling applied around the various break-in panels. Although the APs stated that the segments of the broken lines were to be 12 inches apart, the aircraft manufacturers could, and did, mark them much closer together as can be seen here



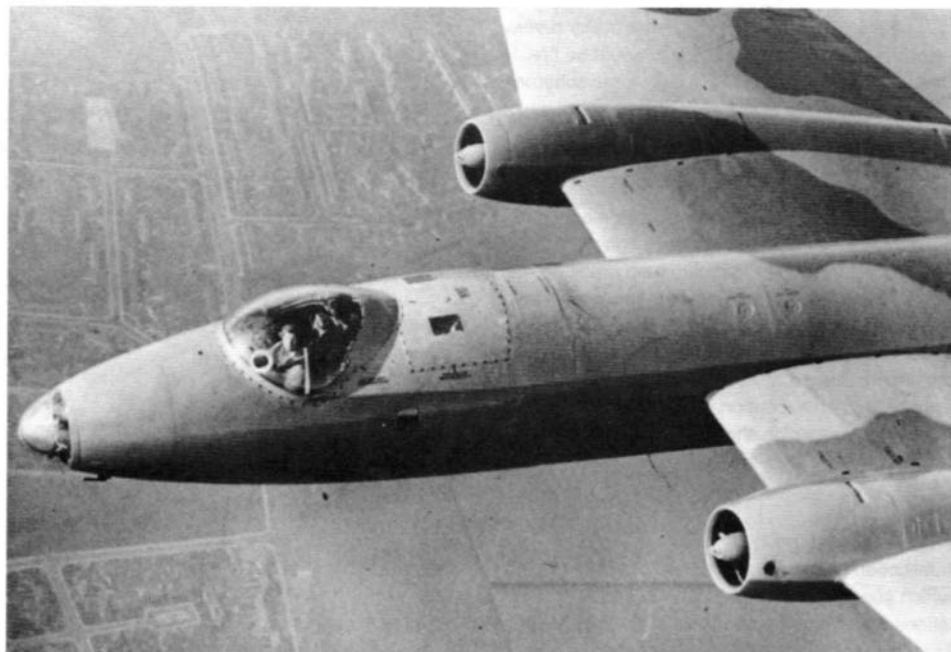
During the summer of 1951 Fighter Command had established a Working Party to study the camouflage of Fighter aircraft. As part of the working party's deliberations, they were flown in a Bomber Command Washington at an altitude of 30,000 feet where they were able to observe, compare and contrast a number of different fighters finished in different colour schemes. These consisted of a USAF F-84 with a polished natural metal finish; a Meteor F.8 in a painted Aluminium finish; a Meteor F.8 in the Light Slate Grey, Medium Sea Grey and PRU Blue scheme from AMO A. 217/51; a Mosquito finished in the wartime Night Fighter Scheme of Medium Sea Grey and Dark Green and a Meteor NF.11 finished in the Night and All Weather Fighter Scheme introduced by AMO A.217/51 of Dark Sea Grey and Dark Green on the upper surfaces and Medium Sea Grey on the under surfaces.

According to the Working Party's interim report dated 19 October 1951, this trial showed conclusively that the F-84 reflected so much direct sunlight in so many different positions relative to the sun that the natural metal finish was useless as a form of camouflage. It was also apparent that the Aluminium-painted Meteor was the most difficult to see, although on occasion it reflected the sunlight in such a way as to make the aircraft very easy to see at a considerable distance. The new Light Slate Grey, Medium Sea Grey and PRU Blue scheme provided a reasonably successful form of camouflage except that the Meteor so finished was more obvious than the Meteor finished in Aluminium.

The Working Party's final report was dated 1 January 1952 which confirmed their earlier findings and recommended that both Short Range Day Fighters and All Weather Fighters of Fighter Command should be finished in 'silver'. It was however emphasised that these recommendations applied to the interceptors of Fighter Command only as consideration had not been given to Fighters employed in other theatres or other roles.

The conclusions of the Working Party's final report, which resulted in a painted Aluminium finish which became known as High Speed Silver being adopted by Fighter Command's interceptors such as the Meteor F.8, were apparently noted by Bomber Command. On 29 February 1952 Bomber Command wrote to the Air Ministry on the subject of the camouflage of Bomber Aircraft stating that Bomber Command had recently reviewed the problem of camouflage for Bomber Aircraft.

The letter went on to state that the Night Fighter had been responsible for the vast majority of Bomber Command's casualties during the Second World War and would continue to be the major



This unidentified Canberra B.2 in the Medium Sea Grey and Light Slate Grey upper surface and PR Blue under surface scheme shows to advantage the wing walkway markings, the break-in panel markings around the cockpit and the absence of the triangular-shaped ejection seat warning markings

threat in the immediate future. Bomber camouflage should be therefore aimed at deceiving the Night Fighter. It was claimed that it had been established that the most suitable camouflage surface for use at high altitude by night was one which reflected the maximum amount of light and that of the various finishes examined, the present silver finish was the most suitable for the purpose. Bomber Command therefore now recommended that a silver finish be accepted as standard for all Bomber Aircraft and requested that AMO A.217/51 be amended accordingly.

A change in policy

It is thought that the Directorate of Operational Requirements hosted a conference attended by representatives of Fighter Command, Bomber Command, and 2 TAF in Germany during March 1952. Whilst the exact date of this conference is uncertain it is known that it was at this conference that the decision was made that Bomber and Fighter Commands would adopt a silver finish as this was thought to be the most suitable camouflage for use at high altitudes.

Whilst there was some disagreement within the Air Ministry with this decision on account of the case for silver as an effective high altitude camouflage not necessarily having been made,

the problems of inter-Command reinforcement, allocating aircraft in different colour schemes to specific Commands and so on, Fighter Command and Bomber Command appear to have won the day with the adoption of a 'silver' camouflage finish by these two Commands being promulgated in the provisions of AMO A.658/52 dated 18 December 1952.

With the promulgation to the service of this AMO all mention of the Medium Sea Grey, Light Slate Grey and PRU Blue schemes application to Jet Propelled Bombers was dropped. Jet Bombers were now to be finished in High Speed Silver as were all Fighter aircraft based in the UK. This change in policy worked its way through other official documents in due course with AP 970 'Design Requirements for Service Aircraft' being amended on 1 May 1953.

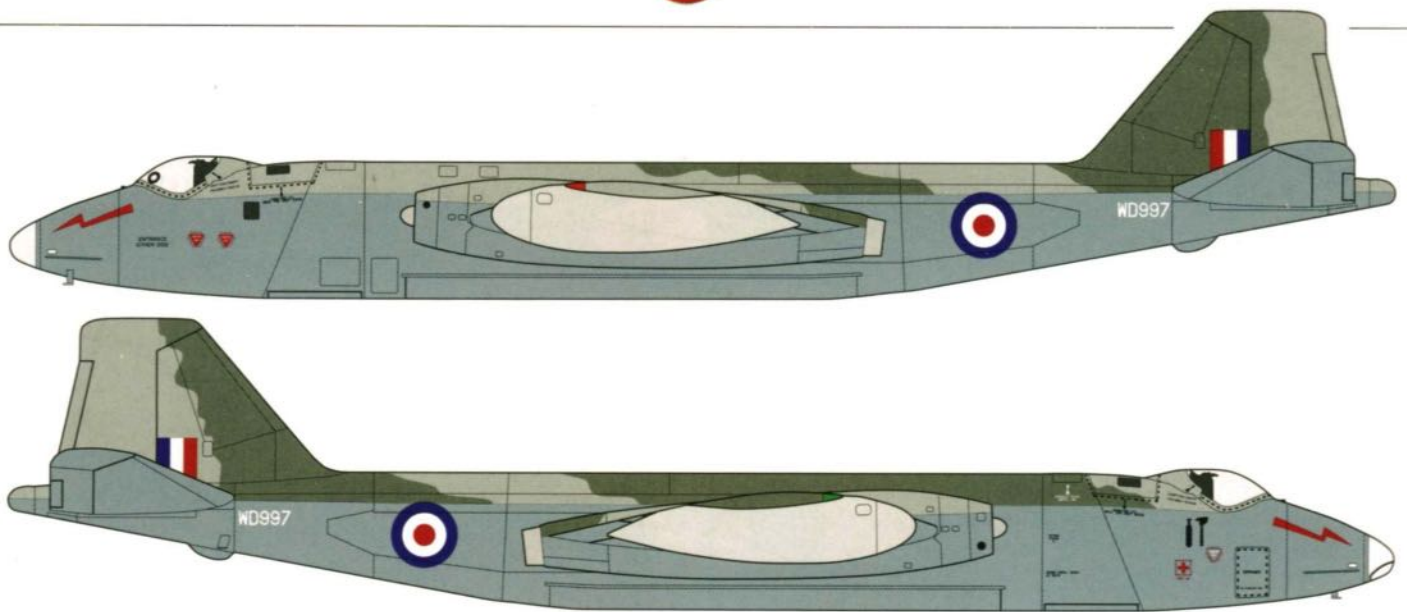
Canberra camouflage changes

By this time the change in policy had already made an impact on the production line. Despite the decision to apply an overall silver finish to Jet Bombers being taken in March 1952, by November no Canberras had actually been delivered in the silver scheme. On 7 November 1952 HQ Bomber Command wrote to the Air Ministry to complain that some eight months had passed since the Air Staff had approved the change in camouflage and no aircraft had as yet appeared in the silver scheme. HQ Bomber Command wished for the matter to be dealt with as a matter of urgency and requested that it be informed when it could expect to receive the first aircraft in the silver camouflage scheme.

The Air Ministry replied on 20 November informing Bomber Command that English Electric had been instructed in early April 1952 that the Canberra was to be finished in silver and a modification was agreed which was to include both changes in colour and material specification. The new material specification was proof against the new synthetic lubricants which would be necessary for continuous operation of the aircraft in extreme climatic conditions, and would not require periodical polishing as did the present finish.



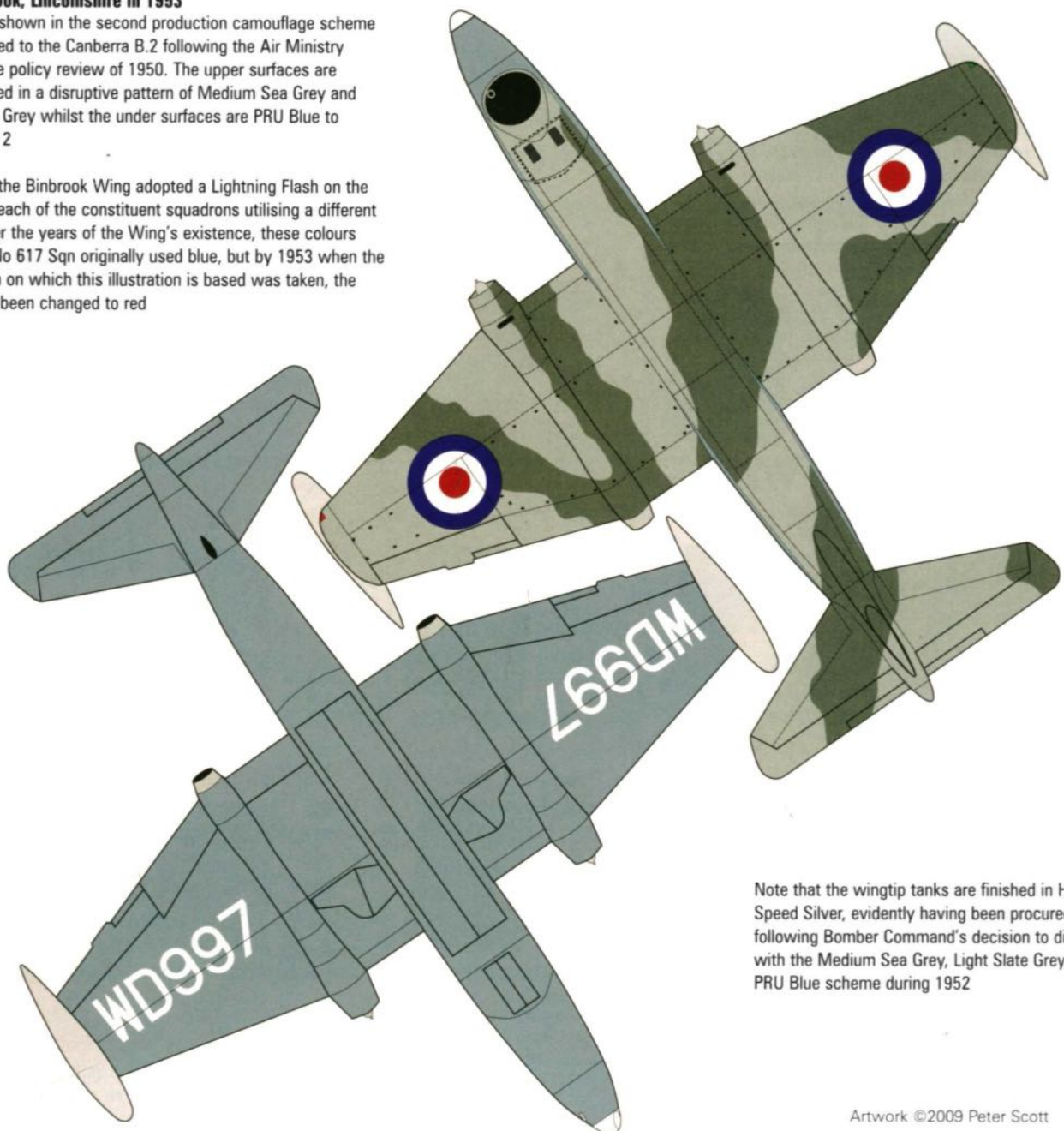
Canberra B.2s of No 12 Sqn lined up at Binbrook in 1952. Note the mix of finishes – Medium Sea Grey and Light Slate Grey/PR Blue and Medium Sea Grey/Anti-Searchlight Glossy Black



English Electric Canberra B.2 WD997 of No 617 Sqn based at RAF Binbrook, Lincolnshire in 1953

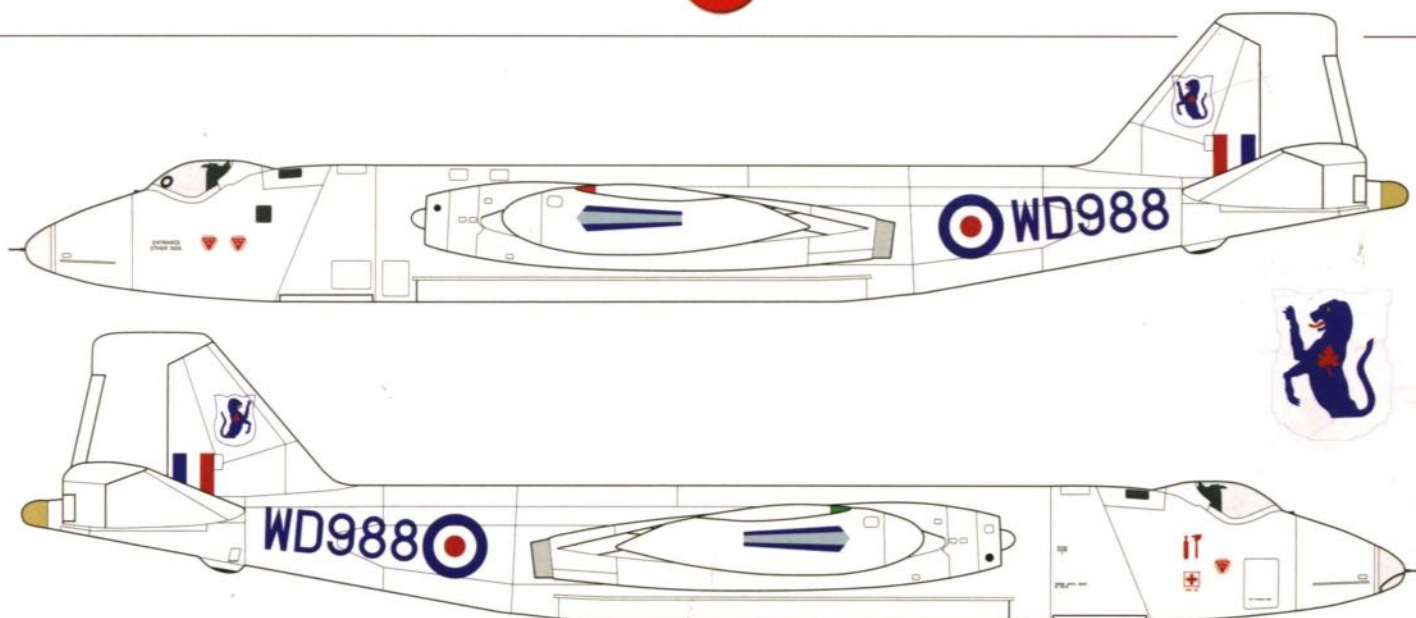
WD997 is shown in the second production camouflage scheme to be applied to the Canberra B.2 following the Air Ministry camouflage policy review of 1950. The upper surfaces are camouflaged in a disruptive pattern of Medium Sea Grey and Light Slate Grey whilst the under surfaces are PRU Blue to Pattern No 2

Aircraft of the Binbrook Wing adopted a Lightning Flash on the nose with each of the constituent squadrons utilising a different colour. Over the years of the Wing's existence, these colours changed. No 617 Sqn originally used blue, but by 1953 when the photograph on which this illustration is based was taken, the colour had been changed to red



Note that the wingtip tanks are finished in High Speed Silver, evidently having been procured following Bomber Command's decision to dispense with the Medium Sea Grey, Light Slate Grey and PRU Blue scheme during 1952

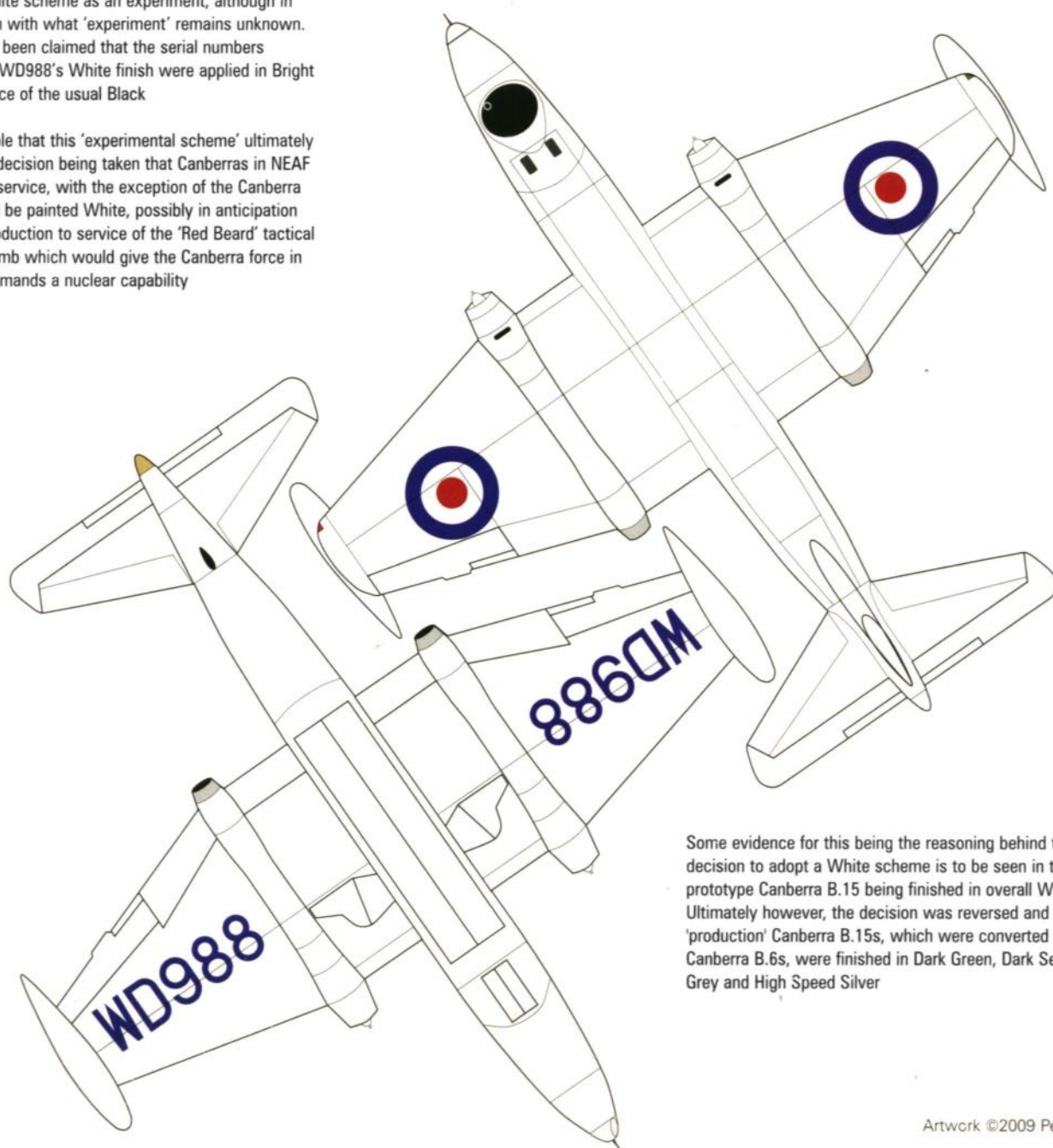
Artwork ©2009 Peter Scott



**English Electric Canberra WD988 of No 73 Sqn
based at El Adem, September 1958**

It has been claimed that WD988 was painted in its overall White scheme as an experiment, although in connection with what 'experiment' remains unknown. It has also been claimed that the serial numbers applied to WD988's White finish were applied in Bright Blue in place of the usual Black

It is possible that this 'experimental scheme' ultimately led to the decision being taken that Canberras in NEAF and FEAF service, with the exception of the Canberra B.2, would be painted White, possibly in anticipation of the introduction to service of the 'Red Beard' tactical nuclear bomb which would give the Canberra force in these Commands a nuclear capability



Some evidence for this being the reasoning behind the decision to adopt a White scheme is to be seen in the prototype Canberra B.15 being finished in overall White. Ultimately however, the decision was reversed and 'production' Canberra B.15s, which were converted from Canberra B.6s, were finished in Dark Green, Dark Sea Grey and High Speed Silver

MDF15 – F-14 Tomcat

The Grumman F-14 Tomcat

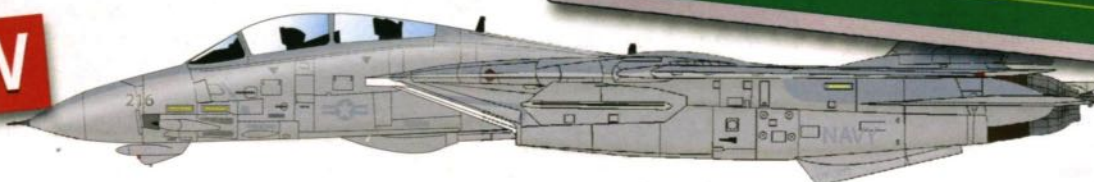
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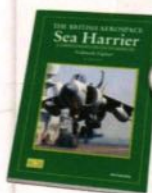


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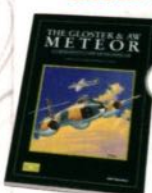


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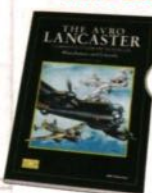


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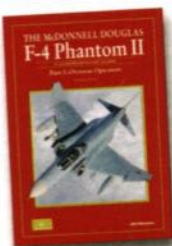
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However, the manufacturer had recently stated that they had not been able to use the finish to the new material specification as there was a considerable increase in the drying time which would lead to serious production delays. As an interim measure and until the production delay could be accepted or until a better material which was impervious to synthetic lubricants became available, English Electric had been instructed to produce Canberra aircraft in silver to the original paint specification. It had now been stated that all aircraft produced after the end of December 1952 would be finished in silver. The Air Ministry was also able to confirm that the Vickers Valiant would also be finished in silver.

In the event, the silver finish was introduced on the Canberra production line by Mod 626 dated 13 January 1953. Photographic evidence would appear to suggest that the change on the English Electric production line took place somewhere between serial numbers WH699, which was complete and awaiting collection from the manufacturers in the Medium Sea Grey, Light Slate Grey and PRU Blue scheme on 30 January 1953, and WH715 which was complete and awaiting collection in a silver finish on 30 March 1953. Once this scheme was introduced it remained in use on the Canberra into the 1960s.

5 March 1953 saw the circulation of DARD Technical Circular No 8 Issue No 4 which included a copy of the information given in AMO A.658/52 as an appendix. As far as the Canberra is concerned, there were two important points to note from the contents of the DARD Technical circular. The first concerned the serial numbers which were applied to the sides of the fuselage. The Technical Circular stated that in future these were to be increased in size to a height of 24 inches, with a width of 15 inches, and a brush stroke of 3 inches. The characters were to be spaced 2 inches apart. The size of the characters under the wings was to remain unchanged.

The second change was one of nomenclature, whereby the words 'aluminium' and 'high gloss' were to be superseded by the words 'silver' and 'high speed' thus giving birth to the term 'High Speed Silver'.

The advent of the High Speed Silver finish gave rise to an anomaly in the surface finish of the forward part of the fin which was made from wood. On Canberras in both of the previous camouflage schemes this panel had been painted to match the surrounding camouflage finish. On the High Speed Silver aircraft, however, it frequently stands out as being a slightly different colour to the rest of the High Speed Silver finish. The exact identity of the finish applied to the wooden forward section of the fin is not currently known. Colour photographs of Canberras appear to show



Canberra B.2, WK130 of No 35 Sqn, RAF Marham, circa 1955 in the overall High Speed Silver scheme. Note the matt black anti-dazzle panel on the nose and the grey-green wooden fin panel (Glenn Sands)

that this part of the airframe could range from something like Medium Sea Grey to grey-green in colour. Photographic evidence implies that once in service, this panel did sometimes receive a High Speed Silver finish as the aircraft was routinely serviced.

Thus from this point on, the Canberra would be finished in High Speed Silver with serial numbers applied to the under surface of the wings in characters 48 inches high, as before, but now with fuselage serial numbers applied in characters 24 inches high. At the same time that these changes were introduced, the colour used for the fuselage serial numbers was changed from White to Black. Black remained the predominant airframe stencilling colour.

Squadron markings

With the Canberra now entering squadron service in ever increasing numbers, a variety of squadron markings began to be seen applied to the aircraft. AMO A.659/52 laid down the following regulations:

Unit code markings

When unit code markings were authorised by Commands, they should be applied to the fuselage aft of the roundel in accordance with the instructions contained in AP 2656A.

Aircraft identification markings

Aircraft identification markings could be painted on individual aircraft to distinguish between individual aircraft within a unit. These were to be applied to the fuselage forward of the roundel in accordance with the instructions in AP 2656A.

In general terms these regulations were nothing more than a description of the well-known squadron codes system, which had been in use by the RAF since the Munich Crisis in September 1938, which was to be used in conjunction with the post-war styles of squadron badges. At the time that 101 Sqn received its first Canberra B.2s in the Medium Sea Grey and Anti-Searchlight Glossy Black scheme, the squadron's existing Lincolns were marked with the squadron codes

'SR' and an individual aircraft letter on both sides of the fuselage in White letters. Perhaps surprisingly, the squadron did not apply similar markings to its Canberras which do not appear to have received any sort of squadron marking. This meant that the first Bomber Command Canberras were relatively anonymous.

As far as is known, no Canberra squadron ever adopted the squadron code system of markings and exactly why the officially sanctioned type of markings were never applied is currently unknown. As more Canberras joined Bomber Command perhaps it was thought that the jet age demanded something altogether more up-to-date, irrespective of the prevailing Air Ministry instructions.

Unit badges

In addition to the squadron codes, unit badges could be displayed on aircraft in accordance with the provisions of AMO A.334/50 as amended by A.649/50. These instructions were reissued by AMO A.232 on 10 September 1953. These orders essentially stated that, at the discretion of the AOC-in-C, badges could be displayed on aircraft either complete with a standard frame and motto provided that the overall height did not exceed 18 inches, or without the frame or motto on a circular white background 18 inches in diameter with a half inch border of RAF pale blue. It would appear that the squadron markings adopted by Bomber Command's Canberra squadrons took advantage of the discretionary clause in these AMO's.

What initially emerged in Bomber Command was a form of Station or 'Wing' marking which was varied according to the individual squadron in the wing. Thus by 1953 the Binbrook Wing had adopted a Lightning Flash on the nose of its Canberras. No 9 Sqn's Canberras had a blue flash, No 12's had a gold flash, No 101's had a white flash whilst No 617's had a red flash. These markings might be seen in conjunction with any of the three camouflage schemes described above, as at one time No 101 Sqn had aircraft wearing all three of these schemes on its strength at the same time!

Squadron markings were the subject of much variation over the many years of the Canberra's service, with those being carried by any one squadron being subject to change almost at the whim of a new Commanding Officer. For this reason any further attempt to describe the individual squadron markings across the Canberra fleet as a whole is impossible in such a relatively small feature as this.

Generally the regulations quoted above remained in force throughout the Canberra's service career with only minor modification which were interpreted in a wide variety of ways. Some of the markings which resulted can be seen in the accompanying artwork and photographs.



Canberra B.2, WJ630 of No 45 Sqn, Far East Air Force, Tengah, Singapore in the overall High Speed Silver finish and black anti-glare panel on the nose. Note the winged camel motif on a circular white background of approximately 36 inches diameter, possibly with a thin blue surround



Canberra B.6s of No 617 Sqn circa 1955, all of which are finished in the overall High Speed Silver scheme in which all B.6s were delivered

Canberra goes to war

June 1954 saw the Canberra B.6 enter service with No 101 Sqn. Based on the Canberra B.2, the Canberra B.6 featured more powerful engines and integral fuel tanks in the wing leading edges. Finished in the overall High Speed Silver scheme, the Canberra B.6s were marked almost identically to the Canberra B.2s described above. Perhaps the most noticeable difference in the airframe stencilling concerned the introduction of the new integral fuel tanks in the leading edges of the wing. These tanks were outlined with a broken Black line whose segments were approximately one and a half inches long by three quarters of an inch wide, which was applied to both the upper and under surfaces of the wings.

The High Speed Silver finish epitomised the Canberra B.6 in RAF service during the mid-1950s, and it was in this scheme that the Canberra B.6s of 101 Sqn went to war in February 1955 when they deployed to Malaya where they became the first Jet Bombers in the Far East and the first in the RAF to drop bombs on an enemy, as they were involved in anti-terrorist strikes as part of 'Operation Firedog'. The following year, the Canberra B.6, along with a number of B.2s in both the current High Speed Silver and earlier Light Slate Grey, Medium Sea Grey and PRU Blue schemes, went to war in November 1956 at Suez as part of 'Operation Musketeer'.

For 'Operation Musketeer' the Canberra squadrons which were normally based in the UK were distributed around the Mediterranean with some squadrons being based on Malta whilst others were based on Cyprus. As 'Operation Musketeer' was to feature an alliance between Britain, France and Israel, it was decided that Allied aircraft taking part in the operation would carry a distinctive marking to facilitate their identification.

The precise origins of the distinctive markings worn by Allied aircraft during 'Operation Musketeer' are not clear. It is thought that they originated with the Anglo-French planning staff which met in the wartime bunkers beneath the Air Ministry under the code name 'Terrapin' from late July 1956. Appendix 'L' to the overall air plan for 'Operation Musketeer' was entitled 'Joint Recognition and Identification Plan', the stated aim of which was to define the procedure and describe the markings used on aircraft and vehicles to assist in the rapid identification of friend from foe during 'Operation Musketeer'.

Markings on aircraft

All Allied aircraft taking part in the operation including those allotted for air defence, but excluding Valiants and helicopters, were to be marked with black and yellow stripes. The markings were

to consist of three yellow and two black stripes alternating round the centre of each wing and around the fuselage or tail boom just forward of the tailplane. For Canberras each black or yellow stripe was to be 2 feet wide whilst for all other aircraft the stripes were to be 1 foot wide.

These markings were to be applied to the aircraft in time for the first operation on D-Day, but in the case of Fleet Air Arm aircraft not before the Carrier force sailed from Malta on D minus 3, or in the case of other forces on D minus 1, which in the event turned out to be Tuesday 30 October.

Whilst it might be reasonable to assume that the planning staffs would have a corporate knowledge of the distinctive markings which were applied to Allied aircraft at the time of the Normandy landings in June 1944, (covered in some detail in MAM Vol 3 Issue 6 June 2004), these markings were black and white. One possible explanation for the Allies' adoption of black and yellow markings for 'Musketeer' might lie in the fact that Egyptian aircraft carried a black and white stripe marking on their wings and around the rear fuselage.

As is usual with the application of such identification markings a range of variations came into being, even on aircraft belonging to the same squadron. For example, whilst the marking instructions called for Canberras to carry stripes that



Canberra B.2 WH971 of No 12 Sqn departing from Hal Far, Malta for the Canal Zone during the Suez Crisis of 1956. Note the yellow and black 'Suez Stripes' on the overall High Speed Silver finish

were 2 feet wide, a number of units applied stripes that were only 1 foot wide. In one well-known instance, Canberra B.2 WH640 of 10 Sqn had three white stripes applied in place of yellow, allegedly due to a shortage of yellow paint.

Some other interesting markings are known to have been carried by some of the Canberras of No 27 Sqn which was normally based at Waddington. No 27 Sqn's markings consisted of the Waddington wing badge which took the form of the City of Lincoln coat of arms on the fin and a red cheat line which ran the length of the fuselage from the leading edge of the tailplane. Some of the aircraft which had taken part in the squadron's European tour of 1954 retained a small Union Flag on the nose just aft of the nose transparency on both sides of the fuselage, and some aircraft also car-

ried the squadron badge inside a standard frame on the nose. At least one aircraft of 27 Sqn is known to have had a bomb log which consisted of small green elephants, each one of which denoted a bombing raid, on the nose. The identity of the aircraft concerned is unfortunately unknown as is the extent of this practice!

'Operation Musketeer' also saw the first operational use of the first of the RAF's four-engined jet bombers, the Vickers Valiant, which had entered service with 138 Sqn during 1955. As this was joined in service by the Avro Vulcan and Handley Page Victor thus building up the strength of the V-Force, the Canberra's importance as a Strategic Bomber began to decline and by the end of 1961 both the Canberra B.2 and B.6 had been retired from front line service in Bomber Command. From 1955 however, the Canberra began to take on greater importance as a Tactical Bomber in the overseas Commands.

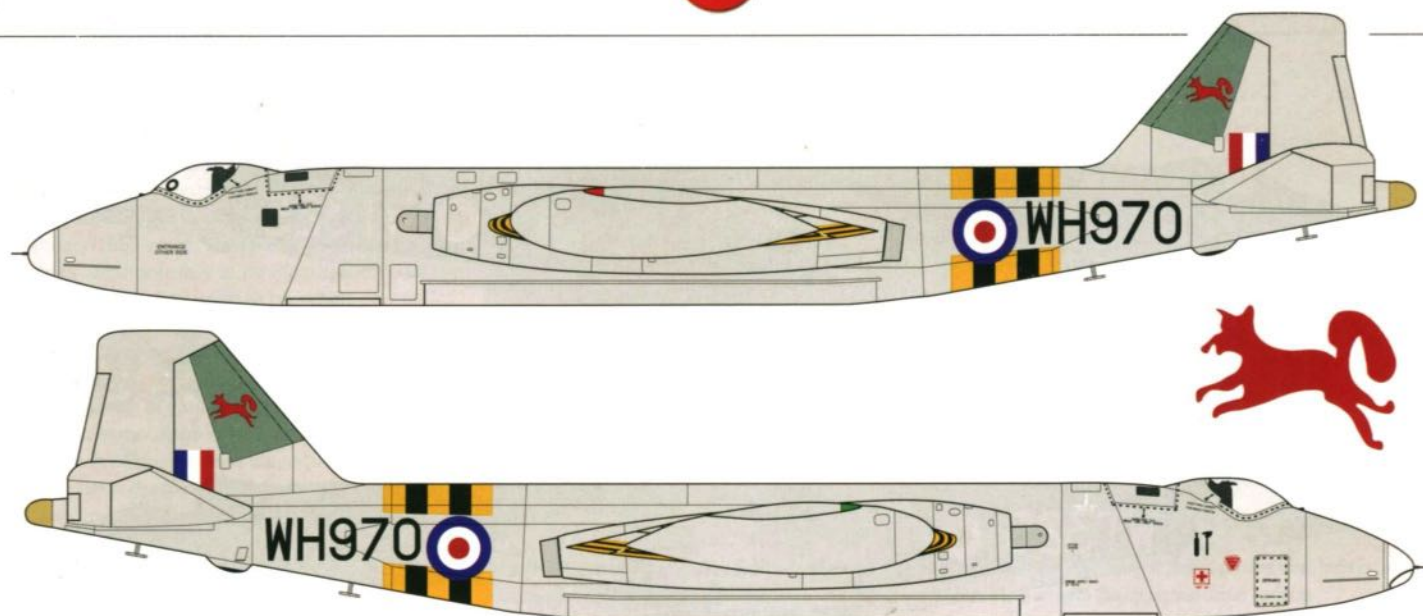
Canberra Intruders

This move to a more tactical role can possibly be said to have begun with the development of the Canberra B(I).6 which entered service with 213 Sqn at Alhorn in July 1955. In the event, 213 Sqn was the only squadron to operate the type which was only really an interim variant pending the introduction of the Canberra B(I).8, (which was covered in Airfile Part 2 in the June 2008 issue of Model Aircraft Monthly).

The Canberra B(I).6 was basically a B.6 equipped with a ventral gun pack containing four 20mm cannon and underwing pylons capable of carrying bombs or rocket launchers. Special bomb doors were fitted which closed around the ventral gun pack leaving the forward part of the bomb bay able to accommodate either flares or bombs. A Mk 3N reflector gun sight was mounted above the pilot's instrument panel whilst a G.45 gun camera was located in the starboard wing leading edge. This was supplemented by an F.24 camera carried in the rear fuselage aft of the bomb bay. Most of these additional devices were controlled by the pilot via a modified control column hand-wheel which carried gun, bomb and camera controls on its right hand grip.

When the Canberra B(I).6 first entered service in March 1956 it did so in the overall High Speed Silver Scheme which had been carried by the B.6s that the aircraft were converted from, with the exception of the gun packs which were finished in Black. This would appear to have been due to the gun packs being produced to meet the requirement for night ground-attack aircraft to be finished in Dark Green and Dark Sea Grey on the upper surfaces and Black on the under surfaces. When seen in side elevation, the boundary between the upper and under surfaces was to follow the centre line of the fuselage but was to be curved upwards or downwards to meet the leading and trailing edges of the mainplane and tailplane roots.

Why the Canberra B(I).6 did not conform to this camouflage scheme on its introduction to service is not known, but during 1957 the overall High Speed Silver finish gave way to a disruptive camouflage pattern on the upper surfaces of Dark Green and Dark Sea Grey to Pattern No 1 which was identical to that carried previously by the Canberra B.2s which had been finished in Medium Sea Grey and Light Slate Grey on their upper surfaces. The High Speed Silver under surfaces were retained, though the upper surface colours were now wrapped around the leading edges.



English Electric Canberra B.6 WH970 of No 12 Sqn based at RAF Hal Far, Malta for 'Operation Musketeer', the Anglo-French invasion of Suez in November 1956

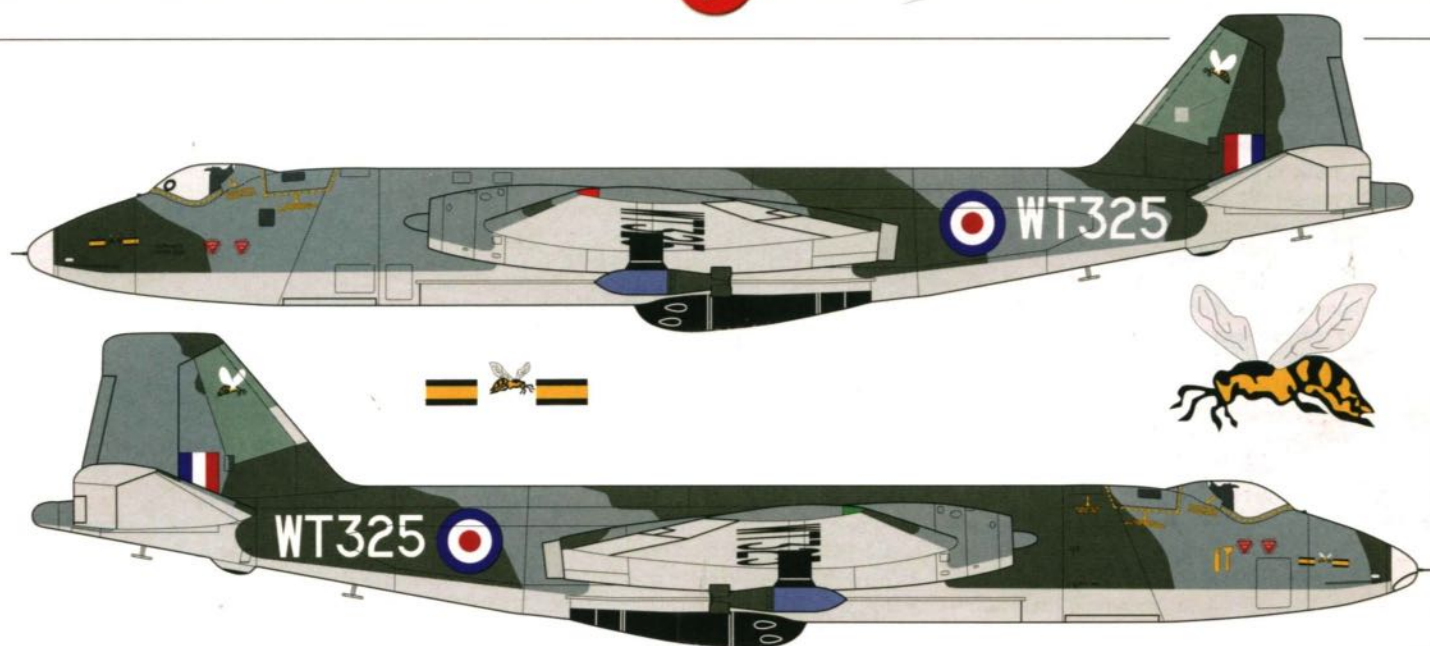
WH970 is shown finished in the overall High Speed Silver scheme which was applied to all Canberra B.6s on the production line. A notable feature of this scheme was the wooden panel on the fin which was usually finished in a shade of grey rather than silver on new aircraft. In practice, this could vary somewhat in shade from something like Medium Sea Grey to a grey green as shown here

The Canberra B.6 saw the introduction of the integral fuel tanks in the leading edges of the wings which were outlined by a broken black line on both upper and under surfaces. These black segments were approximately half the size of those used to outline the wing walkways



No 12 Sqn was one of those units which applied the 'Suez Stripes' in a somewhat narrower width than the 24 inches officially called for, as it would appear that the squadron actually applied its stripes some 12 inches wide. Whilst it is apparent from photographs that these stripes were very neatly applied with those on the fuselage being broken to leave the fuselage serial number easily visible, it is not known for certain whether similar cut-outs were made in the stripes on the under surfaces of the wings, or whether the stripes obscured the serial numbers as shown here

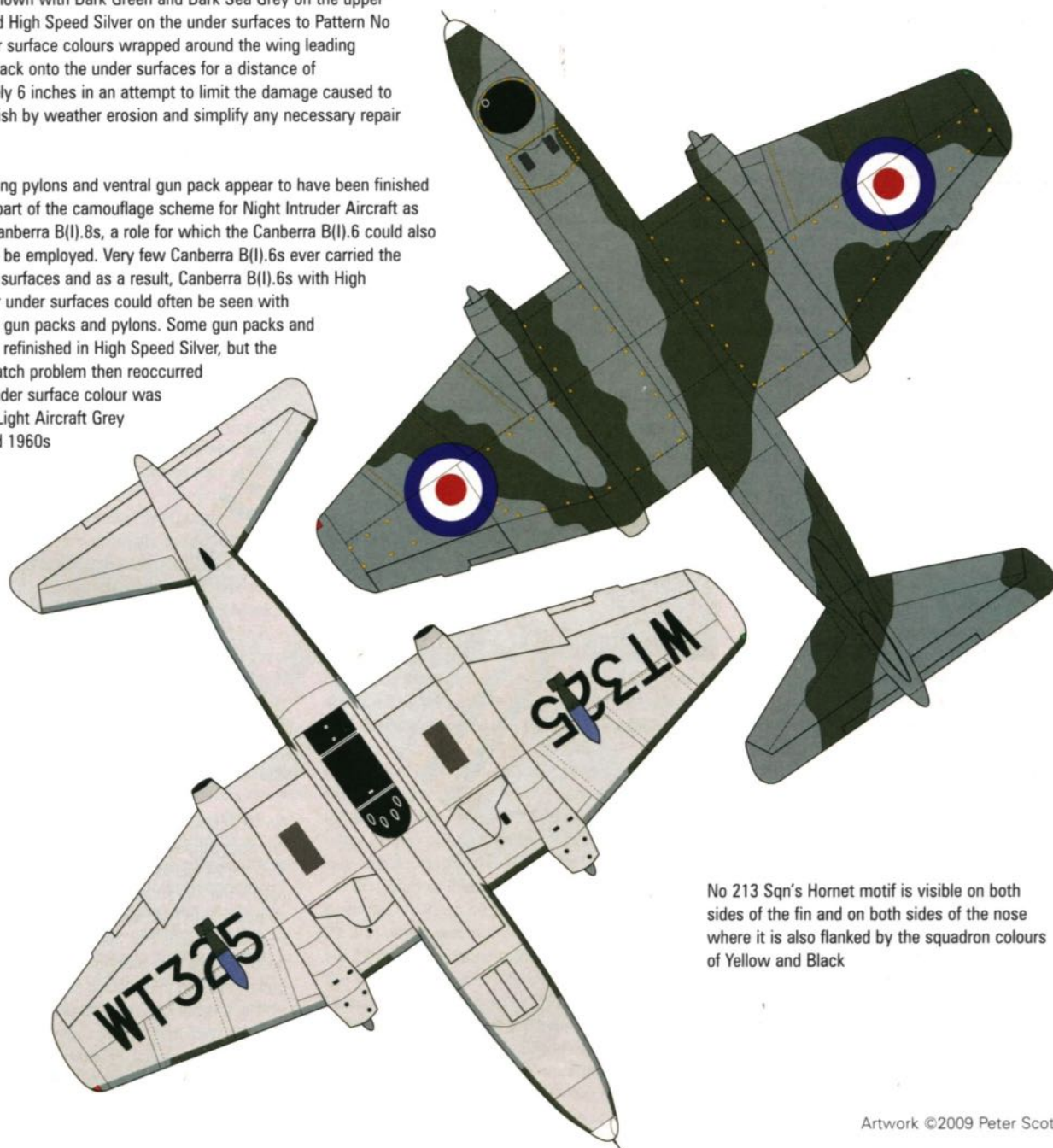
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English Electric Canberra B(I).6 WT325 of No 213 Sqn based at RAF Bruggen, RAF Germany, summer 1960

WT325 is shown with Dark Green and Dark Sea Grey on the upper surfaces and High Speed Silver on the under surfaces to Pattern No 1. The upper surface colours wrapped around the wing leading edges and back onto the under surfaces for a distance of approximately 6 inches in an attempt to limit the damage caused to the paint finish by weather erosion and simplify any necessary repair to the finish

The underwing pylons and ventral gun pack appear to have been finished in Black as part of the camouflage scheme for Night Intruder Aircraft as applied to Canberra B(I).8s, a role for which the Canberra B(I).6 could also theoretically be employed. Very few Canberra B(I).6s ever carried the Black under surfaces and as a result, Canberra B(I).6s with High Speed Silver under surfaces could often be seen with mismatched gun packs and pylons. Some gun packs and pylons were refinished in High Speed Silver, but the same mismatch problem then reoccurred when the under surface colour was changed to Light Aircraft Grey from the mid 1960s



No 213 Sqn's Hornet motif is visible on both sides of the fin and on both sides of the nose where it is also flanked by the squadron colours of Yellow and Black

Artwork ©2009 Peter Scott

Following the application of the Dark Green and Dark Sea Grey camouflage to the upper surfaces, the 24 inch high fuselage serial number which had previously been marked in Black characters was usually reapplied in White. This practice was sanctioned by AMO A.24/58 promulgated in January 1958 which stated that aircraft serial numbers were normally to be Black but on dark coloured aircraft they were to be White, and on grey aircraft, Red.

The fuselage serial number was not the only marking whose colour was changed as a result of the introduction of camouflage. With the introduction of this camouflage scheme on the upper surfaces, much of the airframe stencilling which had formerly been marked in Black such as the wing walkway lines and break-in panels were reapplied in Yellow, including the broken line which surrounded the integral fuel tanks on the upper surfaces of the wing leading edges.

Canberras for the Near East and Far East Air Forces

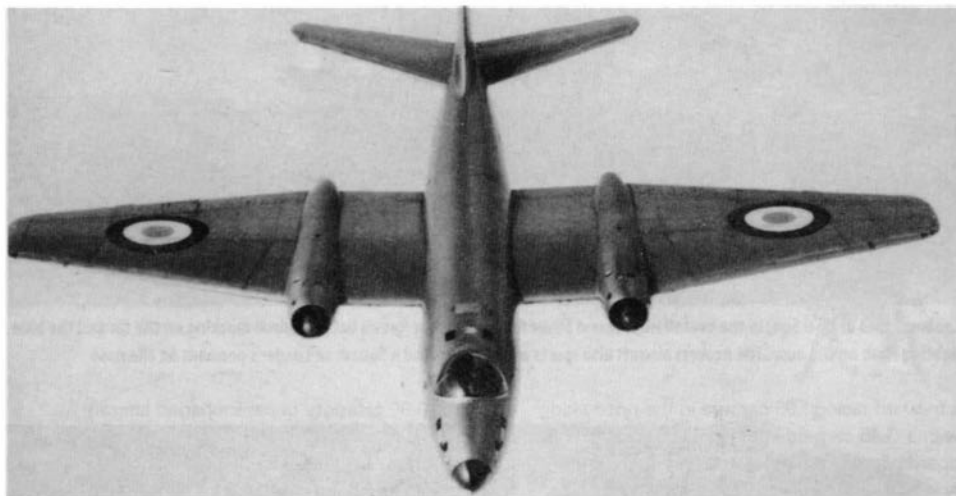
With the rundown of Bomber Command Canberra B.2 squadrons, sufficient surplus aircraft became available to establish a Light Bomber Wing on Cyprus in support of CENTO. This saw Nos 6, 32, 73, and 249 Sqns equipped with B.2s at Akrotiri, all squadrons being in place by October 1957.

By this time, the Malayan Emergency had come to an end and at the same time that the Akrotiri Wing became complete, the decision was taken that Tengah in Singapore would be developed as the jet bomber base in the Far East with plans being laid to expand the existing facilities to provide a 9,000 feet all weather runway for two permanent Canberra squadrons, one of which was to be a Bomber squadron whilst the other was to be a Reconnaissance squadron. In the event, the Bomber squadron selected for service in FEAF was No 45, with the first Canberra B.2s arriving at Tengah in December 1957.

In January 1958, a new AMO was issued on the subject of aircraft camouflage in the form of AMO A.24/58 dated 15 January 1958. This AMO promulgated a wholesale reorganisation of how the camouflage schemes employed on RAF aircraft were classified. There were now to be four basic colour schemes which were to be conformed to by all types of aircraft except Helicopters and Pilotless Target aircraft. The four categories were White Aircraft, Silver Aircraft, Camouflaged Aircraft and Grey Aircraft. The only aircraft in the White Aircraft category at this time were the V-Bombers whilst the Grey Aircraft category were Maritime and Meteorological Reconnaissance aircraft.

The Canberra, basically being classified as a Light Bomber, was covered in part by the Silver Aircraft category and partly by the Camouflaged Aircraft category. In the Silver Aircraft category the AMO stated that Light Bomber and Photographic Reconnaissance aircraft excluding those of the Tactical Air Forces were to have a High Speed Silver finish. This scheme therefore applied to those Canberra B.2 and B.6 aircraft which remained in Service with Bomber Command, the Akrotiri Strike Wing and the Canberra B.2s of No 45 Sqn at Tengah.

In the Camouflaged Aircraft category the AMO stated that Light Bombers and Photographic Reconnaissance aircraft in the Tactical Air Forces were to be camouflaged with a disruptive scheme of Dark Green and Dark Sea Grey on the upper surfaces with High Speed Silver under surfaces to



Overall High Speed Silver scheme finished Canberra B.6 of No 101 Sqn, showing the integral fuel tanks that were built in to the leading edges of the wings. These were surrounded by a black broken line on both the upper and under surfaces

Pattern No 1, and it was this scheme which was applied to the Canberra B(1).6s of No 213 Sqn with 2 TAF in Germany as described above.

White Canberras

The provisions of AMO A.24/58 remained in force for two years until AMO A.285/59 dated 9 December 1959 promulgated a change in the White Aircraft category. Paragraph 4 'White Aircraft' stated, "... the following classes of aircraft were to have a high gloss White finish with the nose forward of the windscreen to be matt black within the pilot's field of vision. (a) Medium Bombers. (b) Light Bombers in MEAF and FEAF (not applicable to Canberra B.2 aircraft)".

Thus it would appear that an overall White scheme was authorised for Canberra aircraft in MEAF and FEAF. Whether this was to have been an Anti-Flash White scheme is not known since on the strength of the available photographic evidence White Canberras in squadron service were comparatively rare, and all of those seen thus far



Canberra B.6, WH974 of No 9 Sqn, in the overall High Speed Silver finish. Note the 'dark' wooden grey-green fin panel and green 'bat' squadron marking on the fin

had conventional Bright Red and Bright Blue roundels with Black serial numbers rather than the Pale Red and Pale Blue versions of these markings which would definitely identify an Anti-Flash finish. That said, however, the 1958-1959 period was about the time that the Anti-Flash 'pale' marking colours were being introduced to replace the traditional 'bright' colours which had been used up to this point on the Anti-Flash finish applied to the V-Bombers.

The reason why the Canberra B.2 was singled out as not being eligible for the White finish is not known for certain. It is interesting to note, however, that it was at about this time that the first British-designed and built tactical nuclear weapon named Red Beard started to become available, and it is possible that it was considered that only those Canberras fitted with the more powerful RA.7 engines would be capable of delivering the

weapon. It might therefore be the case that the White scheme was authorised for Canberras as they were expected to take on a nuclear role within the NEAF and FEAF.

Although in NEAF, No 249 Sqn re-equipped with Canberra B.6s in November 1959 and were followed by 6 Sqn in December 1959, ultimately all the Canberra squadrons in both NEAF and FEAF equipped with a new specialised variant of the Canberra better suited to the tactical strike role that these squadrons were now tasked with.

It is interesting to note that the prototype Canberra B.15, WH967, was finished in the overall White scheme with a matt black anti-glare panel in front of the pilot's cockpit, exactly as specified in AMO A.285/59 with 24 inch high black fuselage serials, 48 inch high black underwing serials and the usually proportioned national markings in the usual places applied in the standard 'Bright' colours.

How widely the all-White scheme was adopted by Canberras already in service is not known. Given the almost total lack of photographic evidence of White Canberras in front line squadron service between December 1959 and November 1960 when AMO A.239/60 appears to have dispensed with the scheme, it would appear that very few Canberras on operational squadrons were finished in overall White. Although No 76 Sqn seems to have had several White Canberras on its strength, it is thought that this was because of the Squadron's involvement with Britain's nuclear weapons trials as it was part of Bomber Command.

Authorisation for White Canberras appears to have been rescinded by AMO A.239/60, dated 23 November 1960, which whilst retaining the 'White Aircraft' category, now contained no reference to Light Bombers, merely stating that the White scheme was only applicable to Medium Bombers and Long Range Photographic Aircraft, which in effect restricted its use to the V-Bombers.

Canberra B.15 and B.16

The 1960s saw the introduction of two new Marks of Canberra to front line service, the B.15 and B.16, both of which were conversions from B.6s which were optimised for the tactical strike role using both nuclear and conventional weapons.

As part of the conversion from B.6 to B.15, new equipment was fitted which included UHF and HF communications equipment, a roller map with a feed from a Doppler navigation system and



Canberra B.6s of No 9 Sqn, in the overall High Speed Silver finish. Note the 'green bat' squadron marking on the fin and the blue lighting flash on the nose. The nearest aircraft also sports a Union Flag and a Squadron Leader's pennant on the nose

a forward facing F.95 camera in the nose along with a G.45 camera in the leading edge of the starboard wing. During the conversion, the opportunity was taken to carry out an extensive general overhaul of the airframes which was expected to give a service life of about ten years.

Armament for the B.15 consisted of a single Red Beard tactical nuclear bomb carried internally within the weapons bay, or alternatively the Canberra's usual 6,000lb conventional bomb load. Underwing pylons identical to those fitted to the Canberra B(I).6 and B(I).8 allowed the carriage of weapons such as a further two 1,000lb bombs, two 2 inch rocket pods or two Practice Bomb Carriers. From 1965, these weapons were further supplemented by the carriage of the Nord AS.30 by the aircraft of Nos 32 and 73 Sqn at Akrotiri, whilst 45 Sqn at Tengah also began to use the AS.30 from September 1967.

The B.16 was converted from Canberra B.6(BS) aircraft which had been fitted with the Blue Shadow Sideways Looking Airborne Radar. As a result of this equipment being fitted, one of the navigator's ejection seats had to be removed. This resulted in the relevant navigator having to wear a special flying suit which had a built-in harness for a chest-type parachute and an oxygen bottle. The other major difference between the Canberra B.15 and B.16 was that the B.16 was never wired to carry the AS.30 missile.

Of the five Canberra squadrons in MEAF and FEAF only Nos 6 and 249 were partly equipped with Canberra B.16s, Nos 32, 73 and 45 Squadrons being entirely equipped with the Canberra B.15.

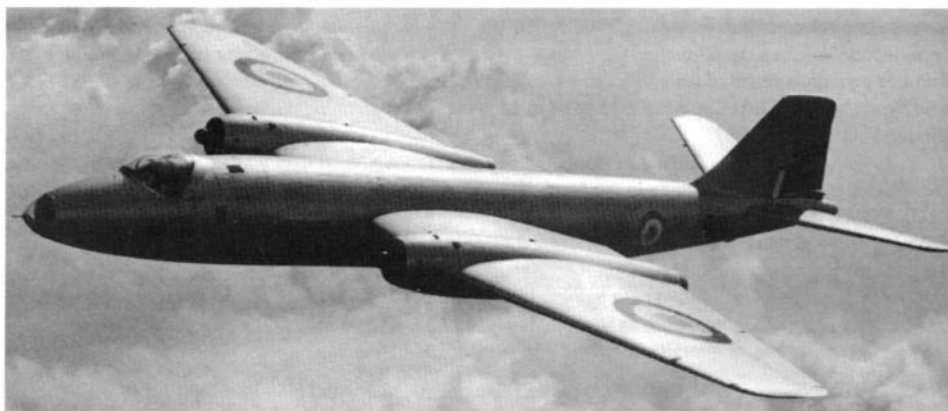
Camouflage for the Canberra B.15 and B.16

The decision not to adopt the overall White scheme for 'production' Canberra B.15s appears to have been taken by the time that the first B.15 conversion, WH961, made its first flight on 4 October 1960 just prior to the issue of AMO A.239/60 dated 23 November 1960, which no longer specified that Light Bombers in NEAF and FEAF should have the overall White scheme. Instead, WH961 was finished on the upper surfaces in a disruptive camouflage scheme of Dark Green and Dark Sea Grey which was identical to that applied the Canberra B(I).6 and B(I).8 whilst the under surfaces were finished in High Speed Silver to Pattern No 1, with the upper surface colours wrapped around the leading edges of the wings in the usual manner. The serial number was applied to the rear fuselage in the usual place in 24 inch high White characters and under the mainplanes in 48 inch high Black characters. This basic scheme appears to have been applied as standard to all the Canberra B.15 and B.16 conversions on the production line. Thus when the Canberra B.15 entered service with No 32 Sqn in August 1961 it fell into the AMO

A.239/60 category of camouflaged aircraft.

Exactly what type of paint was used on these aircraft is currently unknown. Though the camouflage instructions called for a 'High Speed' finish, there were several different DTD specifications available for the purpose. It is thought most likely that the camouflage finish applied to the Canberra B.15 and B.16 would have been applied using materials to DTD Specification 5555 'Exterior Glossy Finishing Scheme (cold curing epoxide type)' which had been introduced from June 1959 and were therefore the most modern available, though it is possible that DTD 772 might have continued to have been used.

During 1963 the wing walkway markings underwent a fundamental change. Whilst previously they had been marked with a broken line which was generally applied in either Black or Yellow in order to stand out from the upper surface finish, they were now revised to a completely different format. The walkways were now to be sur-



Overall High Speed Silver finished Canberra B.6, WJ764 of No 101 Sqn, with which the unit started to re-equip in June 1954

rounded by a solid Yellow border with a Red fringe around the outside. It is thought likely that these new markings would only have been applied when the aircraft were repainted as part of their routine servicing, and thus their introduction might have taken several years across the Canberra fleet as a whole.

Once in squadron service, the basic finish applied to the Canberra B.15 and B.16 underwent minor changes as the squadrons applied their own markings to the aircraft and often also added the serial number to both nosewheel doors in Black characters approximately 8 inches high. As usual, the squadron markings could take many forms, often in breach of the official regulations. For example, when No 45 Sqn in FEAF received their new Canberra B.15s from September 1962, they applied their 'Winged Camel' motif on a circular White background on the fins of the Canberras exactly as authorised in the AMOs with one exception. Instead of being 18 inches diameter as

authorised by the AMOs, the marking was somewhere in the region of 36 inches diameter!

In NEAF, the Squadrons of the Akrotiri Strike Wing also initially applied their markings to the new aircraft in a variety of ways but here the advent of centralised servicing saw these markings removed circa 1964-65 in favour of a new Akrotiri Strike Wing marking, which consisted of a Flamingo above crested waves over a lightning flash. By this time some of the Canberra B.15s had lost their White fuselage serial numbers in favour of 24 inch high Black serial numbers, and further changes were on the way.

British Standard colours

It was during 1964 that an important change took place in the nomenclature of the paints applied to British military aircraft when most of the aircraft colours which were in large scale use by the Services at that time were taken from the Ministry of Supply HMG Aircraft series, which was a supplement to BS 381C and incorporated into BS 381C itself.

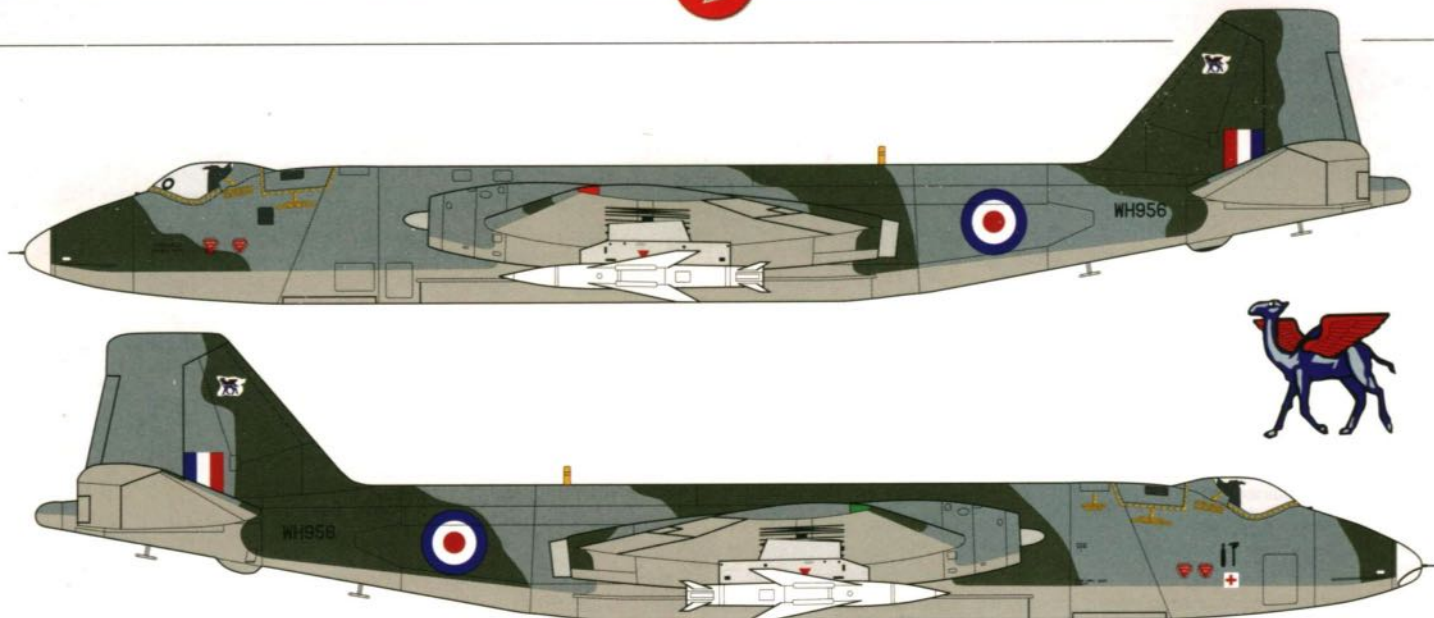
Since 1939 British aircraft camouflage standards had been issued by a variety of different bodies. The Air Ministry issued the first set of camouflage colour standards in 1939 following which responsibility for colour standards was taken over first by the Ministry of Aircraft Production and from 1946 the Ministry of Supply.

BS 381 was originally published in 1930 and subsequently revised as BS 381C in 1948. The 1948 edition then remained in use until the Standard was revised again in 1964 as BS 381C: 1964 Colours for Specific Purposes. The 1964 edition

brought together in one Standard colours which various public bodies, utilities, industry and HM Services required for identification or technical purposes based on long established practice, and amongst the colours introduced to the new edition were some of those contained in the Ministry of Supply HMG Aircraft series supplement to BS 381C referred to above. It is from this point onwards that BS 381C begins to be quoted in connection with aircraft camouflage.

Thus from 1964 RAF Dark Green which had formerly been known as Aircraft Finish No 409 High Gloss Dark Green became BS 381C No 641 Dark Green, and Aircraft Finish No 413 High Gloss Dark Sea Grey became BS 381C No 638 Dark Sea Grey.

This new form of notation appears to have been slow to come into widespread use within the RAF as it was not used in the 1965 edition of AP 1086, the RAF Vocabulary of Stores Section 33B, in connection with the colour name.

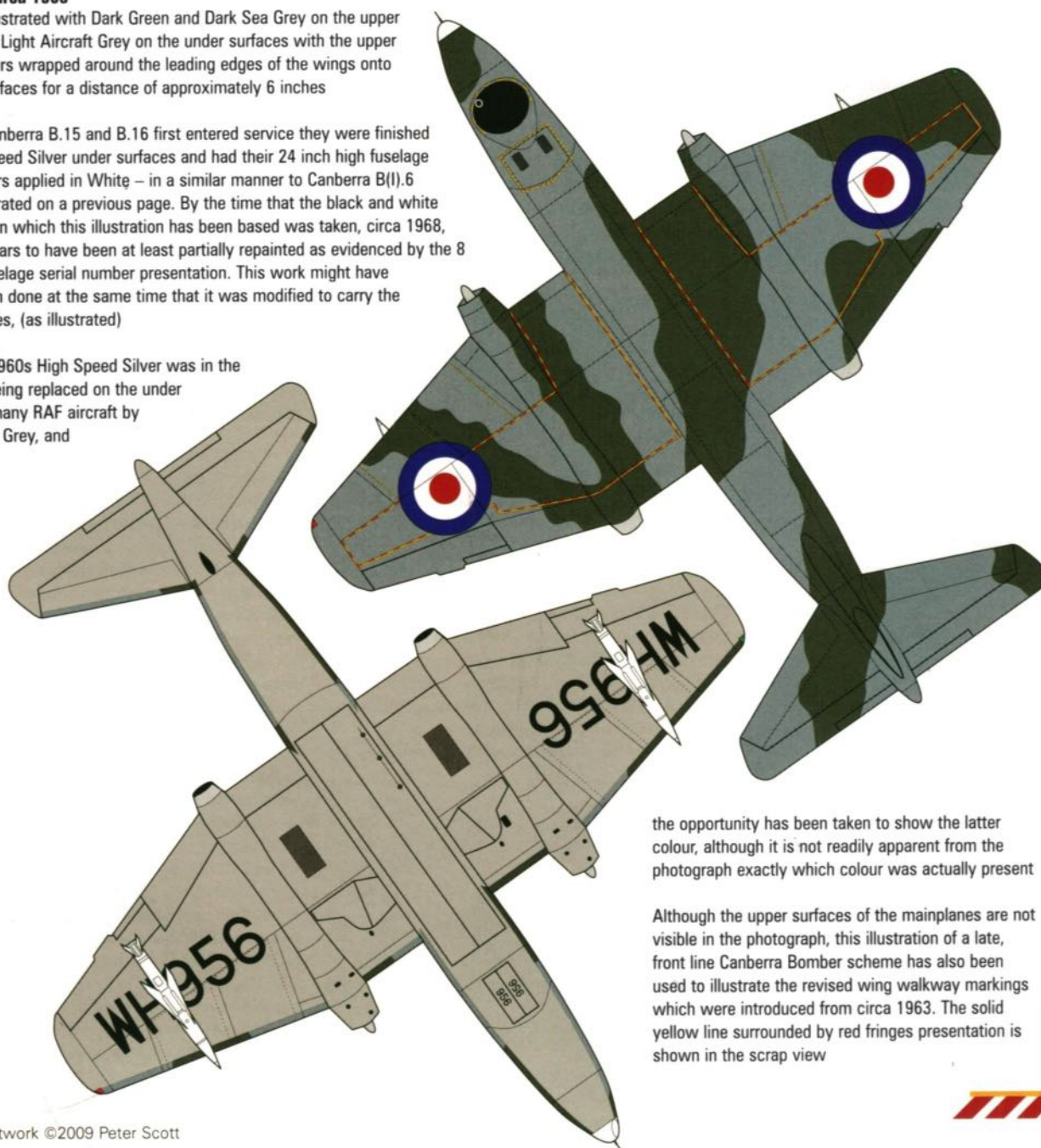


English Electric Canberra B.15 WH956 of No 45 Sqn based at RAF Tengah, Singapore, circa 1968

WH956 is illustrated with Dark Green and Dark Sea Grey on the upper surfaces and Light Aircraft Grey on the under surfaces with the upper surface colours wrapped around the leading edges of the wings onto the under surfaces for a distance of approximately 6 inches

When the Canberra B.15 and B.16 first entered service they were finished with High Speed Silver under surfaces and had their 24 inch high fuselage serial numbers applied in White – in a similar manner to Canberra B(I).6 WT325 illustrated on a previous page. By the time that the black and white photograph on which this illustration has been based was taken, circa 1968, WH956 appears to have been at least partially repainted as evidenced by the 8 inch high fuselage serial number presentation. This work might have possibly been done at the same time that it was modified to carry the AS.30 missiles, (as illustrated)

By the mid-1960s High Speed Silver was in the process of being replaced on the under surfaces of many RAF aircraft by Light Aircraft Grey, and



the opportunity has been taken to show the latter colour, although it is not readily apparent from the photograph exactly which colour was actually present

Although the upper surfaces of the mainplanes are not visible in the photograph, this illustration of a late, front line Canberra Bomber scheme has also been used to illustrate the revised wing walkway markings which were introduced from circa 1963. The solid yellow line surrounded by red fringes presentation is shown in the scrap view

Defence Council Instructions

The provisions of AMO A.239/60 were superseded by those contained in DCI T.346/65 dated 4 August 1965. DCI T.346/65 was effectively a complete rewrite of the RAF's camouflage and marking instructions. This DCI did away with the practice of setting out the camouflage and marking instructions for RAF aircraft in terms of different finishes such as 'White Aircraft' and 'Camouflaged Aircraft' and returned to the practice of describing the finish according to the role of the aircraft.

As far as the Canberra B(I).6, B.15 and B.16 was concerned, these aircraft might be considered to be either a Light Bomber or Tactical Strike Aircraft. In either case the camouflage and marking instructions contained in DCI T.346/65 were essentially identical. The instructions for Light Bombers can be taken as being accurate for both roles and were as follows.

Light Bombers were to have all upper surfaces, fuselage sides, fin and rudder finished in a disruptive pattern as illustrated in AP 2656A where the shaded areas in the illustration were to be painted Dark Sea Grey and the unshaded areas were to be painted Dark Green. The under surfaces of the fuselage, mainplanes and tailplanes were now to be light grey colour 9-095/BS 2660.

This was only a temporary instruction, and it was soon replaced by a standing DCI, S.126 dated 10 August 1966 which then remained in force until August 1969. The wording of the section on Light Bombers remained identical to that of the earlier DCI T.346/65.

A new material and new colour

The new requirement with regard to the under surface colour had arisen following the RAF's decision to switch from its traditional cellulose, synthetic and the more recent epoxy paints to a new generation of polyurethane paints. The decision to adopt polyurethane had been taken as it was thought that a polyurethane finish would offer an all-round increase in durability especially where the increased hardness of the material would overcome the problem caused by the erosion of the painted surface from the leading edge of the wings. At the same time, it was thought that the polyurethane finish would offer enhanced resistance to Nuclear, Biological and Chemical products as it was easier to clean following exposure.

One drawback to the new polyurethane finish was that for some reason, it was technically impossible at that time to produce a suitable polyurethane paint which would bestow the silver finish which was a feature of many RAF colour schemes on the aircraft. As a consequence of this,



Canberra B(I).6, WT325 of No 213 Sqn, Bruggen, RAF Germany, summer 1960, in the Dark Green and Dark Sea Grey upper surface and High Speed Silver under surface finish. Note the gun pack and underwing pylons in black

a light grey colour was chosen which was intended to bestow a colour as close to silver as was possible on an aircraft. The colour chosen for this purpose was chosen from an existing British Standard, BS 2660.

Polyurethane finish BS 2660

BS 2660 was entitled 'British Standard for Colours for Building and Decorative Paints' and was first introduced in 1955. It remained in use with various amendments until replaced by BS 4800 'Specification for paint Colours for Building Purposes' in 1972. Colours within BS 2660 did not have names, only reference numbers, so when colour 9-095 was selected for use by the RAF it had to be given an appropriate name. Therefore BS 2660 colour 9-095 was incorporated into BS 381C as No 627 Light Aircraft Grey as part of Amendment No 1 to BS 381C (1964) on 30 August 1966.

The new polyurethane finish was subsequently listed in AP 1086 the RAF Vocabulary of Stores section 33B under the heading 'Paint System, cold cured polyurethane to Spec DTD 5580A'.

How many Canberra B(I).6s, B.15s or B.16s received a polyurethane finish is open to question. One of the problems with the polyurethane finish was that as it needed specialist facilities to apply which did not exist on Cyprus, any aircraft which was to be finished in polyurethane would have to be flown to Safi on Malta where the necessary specialist facilities had been established for that Theatre. Exactly what facilities were available for FEAF are currently unknown.

It is known that a number of Canberra B(I).6, B.15 and B.16s did receive Light Aircraft Grey under surfaces between 1965 and their withdrawal from service in 1969-70, but it is not known for certain that they had a polyurethane finish since the Light Aircraft Grey could have been applied using DTD 5555 Cold Cure Epoxide.

Besides the change in under surface colours

and materials, many Canberra B(I).6, B.15 and B.16s also exhibited a change in their markings during the mid 1960s when the 24 inch fuselage serial presentation gave way to 8 inch high characters. It has been suggested in the past that this might be indicative of the introduction of a polyurethane finish on some aircraft.

Unit markings

The DCIs covering the application of unit markings which ran concurrently with DCI S.126/66 was DCI S.13/65 'Unit Badges on Aircraft and RAF Property' dated 27 January 1965 and DCI S.223/67 dated 13 December 1967. These instructions stated that unit badges could be placed on aircraft and other RAF property provided that they had been accepted for registration by the MoD (Air Force Department) and the Inspector of RAF Badges and approved by The Queen. The rules remained as previously described. These basic rules then remained in force without alteration until the Canberra B(I).6, B.15 and B.16 were all retired from service in 1969-70.

Centralised servicing had proved unpopular throughout the RAF as a whole and though theoretically more efficient, the Akrotiri Strike Wing found that their serviceability levels dropped following its introduction, largely as a result of the aircrews no longer being able to carry snags with the aircraft from one sortie to another as they no longer knew who would be flying the aircraft next. As a result, the concept slowly started to die out from about 1968 and the squadrons were once again able to apply their markings to individual aircraft which now began to appear in conjunction with the Akrotiri Strike Wing's Flamingo badge.

Perhaps the most impressive of these markings were applied by No 32 Sqn which applied its squadron colours of blue and white either side of the fuselage roundels fighter-style with the squadron number applied to a White background in Roman numerals on the fin, along with an individual aircraft letter on the fin in red.

Centralised servicing never appears to have led to squadron markings being dropped by either 213 Sqn on its Canberra B(I).6s or 45 Sqn on its Canberra B.15s, as they were the only squadrons operating their types of aircraft in their respective Theatres. No 213 Sqn was thus able to retain its Hornet motif throughout its service in RAF Germany which in its final version was applied in very impressive proportions on the fin, whilst No 45 Sqn's 'Winged Camel' eventually ended up being very much reduced in size following an apparent repaint which also saw the 8 inch high black serial number introduced and may also have seen the introduction of Light Aircraft Grey under surfaces. **MAN**



Canberra B.15, WH965 of No 45 Sqn, Far East Air Force, in the Dark Green and Dark Sea Grey upper surface and High Speed Silver under surface finish circa 1963. The break-in panels on this camouflaged aircraft are outlined with a broken yellow line

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Canberra TT.18 WJ682 'CU'. Built as a B.2 in 1955, it was later converted to TT.18 standard and issued to 100 Squadron. Although frequently reproduced, this image of WJ682 in company with Phantom FGR.2, XV442, serves to illustrate what is perhaps, a more familiar RAF Canberra TT colour scheme. (Author's collection)

Candid Canberra in colour

Martin Derry provides a photographic miscellany of the English Electric Canberra B.2 and its various derivatives in RAF and Ministry service

Designed to complement the recently released Airfix 1/48 scale Canberra B.2, (or, as in the author's case, the Classic Airframes' equivalent, still patiently awaiting its turn to emerge from the loft!), the PR and B(I).8 variants have been purposely excluded – for the time being...

In no way is it suggested that all of the B.2 derivatives and colour schemes are included here, but it is hoped that the modeller may find sufficient inspiration to consider a number of options

when painting or adapting their model beyond those suggested by the kit manufacturer. The images are arranged by Mark, then alpha-numerically in ascending order. Dates and locations are stated where known although, sadly, in some instances, these details are missing from the original images.

Many of the photographs which appear in this article were supplied courtesy of the Newark Air Museum unless otherwise stated. **MAM**



Canberra B.2, WE113. Delivered in 1952, this aircraft was later converted to become a B(TT).2, an unofficial designation applied to at least seven B.2s modified to tow targets. WE113 is seen in 100 Sqn markings as portrayed by the skull and crossbones inset on the blue and yellow checks on the tail. (Newark Air Museum)



A familiar and perhaps rather hackneyed photograph which, nevertheless, is indicative of the early appearance of the first Canberras to enter service with Bomber Command. This aircraft is in fact one of the B.2 prototypes, most probably VX165, which first flew on 21 April 1950. (Newark Air Museum)



Canberra B.2, WH666. Delivered in 1952 this aircraft also became a B(TT).2 at a later date. WH666 is seen whilst serving with 56 Sqn, a fighter unit with a Target Facilities Flight attached, whilst at Akrotiri, Cyprus, between 1968/9 and January 1975. WH666 wears 56 Squadron's red and white bars either side of their phoenix motif, repeated on the tail. (via Tony Buttler)



Canberra B.2 WH703. Delivered in 1953, this aircraft served with 231 OCU (twice), 85 Sqn and 100 Sqn (twice). This image shows WH103 'U' whilst serving with 100 Sqn and undergoing inspection in the early to mid-1970s. It became a ground instruction airframe at Marham in 1976, as 8490M. (Author's collection)



Canberra B.2, WJ573. Delivered in 1953 and seen at Henlow in May 1963, this Canberra displays a weathered high-altitude day-bomber colour scheme of Medium Sea Grey and Light Slate Grey upper surfaces with PRU Blue lower surfaces. WJ573 had arrived at Henlow in 1960 and was allocated the maintenance serial 7656M in December that year. (Newark Air Museum)



Following service with the CAW and transformed (colour-wise) from the previous photo, WP515 joined 85 Sqn at West Raynham, where this photo was taken. The Squadron's hexagonal motif is displayed on the fin and its colours either side of the fuselage roundel. (Author's collection)



Canberra B.2 WJ728. Delivered in 1954 this aircraft served with several units, its last being 100 Sqn in whose colours it is seen here. In 1976, WJ728 was allocated to the RAE in 1976 and broken up in 1984. (via Tony Buttler)



Canberra B.2, WH673. Delivered in 1953 and seen at Syerston in September 1957, whilst serving with the Royal Air Force Flying College, Manby. Excluding the red outer wing, fin and horizontal tail surfaces, WH673 appears to be finished in a PR scheme; however, closer examination reveals a faded high-altitude day-bomber scheme, still in use at this time. (Newark Air Museum)



Canberra B.2, WJ603. Delivered in 1953 and seen at Waddington on 19 September 1964, this aircraft was allocated to Watton-based 98 Sqn, whose badge, (with red bars containing white diagonal stripes on either side), is visible on the nose. At this time the squadron was part of Signals Command, later to become No 90 (Signals) Group on 1 January 1969, within Strike Command. (Newark Air Museum)



Three B.2s from the RAF College of Air Warfare (CAW) seen over Waddington on 14 September 1963. They comprise – WP515 in overall black with copious quantities of Day-Glo orange applied; WK118 (leading) and WJ981. All were later converted to other roles – WP515 became a B(TT).2; WK118 a TT.18; and WJ981 became a T.17 and later still a T.17A. (Newark Air Museum)



A closer view of WH703's tail section. By this stage the aircraft was finished in a training colour scheme which consisted of white upper, and red under, fuselage surfaces; the wings and tailplane were grey. However, was this Medium Sea Grey, Light Aircraft Grey or some other shade? Sources conflict! (Author's collection)



Canberra T.4 WJ870. Delivered in 1954 it is seen here at Finningley in September 1965. There are no visible clues as to which unit operated this aircraft when this photograph was taken; it does however serve to illustrate a work-stained condition in contrast to the many pristine Canberra images available. (Author's collection)



Canberra T.4. Delivered as a B.2, WD963 was subsequently converted to a T.4 and is shown whilst on loan to 75 Sqn RNZAF in 1959 or 1960. Finished in overall High Speed Silver with yellow training bands, WD963 retained the standard RAF national markings, the tail however was adorned with a Kiwi superimposed on a map of New Zealand. (Newark Air Museum)



Canberra T.4 WT480. Delivered in 1954, this image was obtained whilst it served with 231 OCU as indicated by the leopard's head, (extracted from the 231 OCU Badge), set on a white shield upon the fin. (Author's collection)



Canberra T.4 WT489. Delivered in 1955, it would appear that it only ever served with Binbrook's Station Flight and 231 OCU, before crashing in April 1967, killing all three crew members. This photo was taken at Langar on 7 July 1962. (Newark Air Museum)



Canberra B(I).6 WT309. Delivered in 1955, this Canberra served with the Royal Aircraft Establishment prior to being transferred to the A&AEE at Boscombe Down. When photographed there on 10 June 1990, WT309 had been grounded for two years or so and was in use as an 'apprentice trainer' as evidenced by the wording below and to the rear of the cockpit. (Author's collection)



WT480 once again. The leopard's head faced to the rear on the Canberra's starboard side and forward on the port. (Author's collection)



Canberra B.6 WH953. Delivered in 1955 to the Radar Research Establishment Defford as a standard B.6, WH953 underwent various (local) modifications enabling it to be used in several radar research programmes throughout its long career, at some point becoming classified as a B.6(mod). Seen at Boscombe Down on 10 June 1990, WH953 was displayed with a large flake of red paint missing from its fin. (Author's collection)



Canberra T.11 WH904. Delivered in 1954 as a B.2, it was later converted to become a T.11, as seen here, its original purpose being to train Gloster Javelin navigators in the use of AI radar. WH904 is finished, principally, in High Speed Silver and bears 85 Squadron's badge, (behind the cockpit), and the Squadron's colours either side of the fuselage roundel. (Author's collection)



WH904 'D', seen at a later stage in its life at Binbrook, with a predatory Lightning in its lair below. Sadly both of these photos are undated, but it is possible that WH904 was, by this stage, a T.19, there being little external difference between the two Marks. The two colour schemes are worthy of comparison. (Newark Air Museum)



The nose of WJ633. 'Beauty is in the eye of the beholder!' Margaret Wolfe Hungerford, 1878. (Newark Air Museum)



Canberra T.17A WJ633 'EF'. Built originally as a B.2 and delivered in 1954, this aircraft was one of six T.17s upgraded to become a T.17A from the mid-1980s and is believed to have been the last converted to this standard. Seen at Finningley on 17 September 1988, 360 Squadron's moth and trident motif is displayed on the fin. Their motto, appropriately enough, was 'Confundemus' (We shall throw into confusion). (Newark Air Museum)



Canberra T.17 WJ986. Delivered in 1953 as a B.2, it later became one of twenty-four redundant airframes chosen for conversion to T.17 status in 1965, following which WJ986 was operated by 360 Squadron, the joint RAF/RN ECM unit. The tips of the nose and nose blisters illustrated here are black, however, with the passage of time these areas were often overpainted in matching camouflage colours. (Author's collection)



Canberra TT.18 WJ636 'CX'. Built as a B.2 in 1954, this Canberra was converted to become a TT.18, (ie for the Target Towing role), from October 1967, after which it was allocated to RN charge, until entering storage in February 1987. Ostensibly, 100 Squadron received WJ636 in 1990 and most sources seem to reflect this view. However, the author photographed this aircraft at Finningley in September 1987, with 100 Squadron's skull and crossbones motif clearly evident, set on a pale blue disc within the checked section of the fin. (Author's collection)



Canberra B.15 WT209. Delivered in 1956 as a B.6, it was later converted, following which it was issued to 45 Squadron, (their winged-camel motif can be seen on the fin), at Tengah, Singapore, where this photo was taken. It would appear to have suffered considerable weathering around its nose, wing and fin leading edges, the result of flying through a tropical storm, perhaps? (Author's collection)



A starboard view of WJ636 at the same location and same date. (Author's collection)



The inclusion of this image contradicts the author's opening statement – hopefully the editor will have applied a blind eye. Canberra B.2 WK137, was delivered to the RAF in 1954, sold to West Germany in 1966 and coded 99+34 in 1976. It, and two others obtained by West Germany, were all distinctively finished in an all-over orange colour scheme. However, for whatever reason, this aircraft received replacement wings from TT.18, WK123 in early 1992, in which year this photo was taken. The 'new' wings have yet to be repainted, providing a short-lived oddity option for the modeller! (Author's collection)



A poor quality image of an unidentified TT.18, (possibly WJ682 'CU'), included to illustrate the distinctive colouring and pattern applied to the lower surfaces of this Mark. (Author's collection)



Finnish Hawk

Randy Lutz details and improves the HobbyCraft 1/48 scale Curtiss P-36 into a Finnish Curtiss Hawk 75A-2

This model is part of another one of my grandiose modelling plans, which never seem to come to fruition. About ten years ago I thought it would be a great idea to model a collection of Curtiss Hawks representing each nation that operated the P-36/Hawk 75...

By my estimation, the P-36 was flown in the markings of the UK, South Africa, USA, Brazil, Dutch East Indies, Norway, France, Germany, Portugal, Peru, Argentina, China, Thailand, Iran and Finland. Well that's fourteen countries and I have managed only one in ten years. At this rate, I will be dead before I can finish another three!

The starting point for this build was based on the HobbyCraft P-36A/C USAAC, (kit HC1555). However I could just as easily have used HC1546, which is the P-36 Pearl Harbor Defender, or the Curtiss 'French' Hawk 75, (it HC1560), as both of these kits have the correct engine/cowl assemblies. You are cordially invited to refer back to 'Model Aircraft Monthly' October 2004, Volume 3, Number 10 for a detailed breakdown of the variants of Curtiss Hawks and the particulars of the various HobbyCraft boxings.

The first step was to go through the kit and remove all the parts that would not apply to a Finnish Hawk 75 and to also determine where I would have to correct, or modify the kit to improve the accuracy.

When I mention accuracy, I do not mean that I compared the kit to scale drawings to verify length and wingspan etc, as I have found over the years that you can never really be sure that the drawings you are using are accurate. Besides, I subscribe to the theory that if it looks like a Curtiss Hawk, then it must be a Curtiss Hawk and I don't need to go searching for problems. I have my job for stress and I sure don't need any stress in my hobby. If you choose to be a rivet counter and use a micrometer to make sure the tailwheel strut is the right diameter, go ahead, and I hope you have a nice life...

Anyway, I digress. When it comes to Curtiss Hawks, it really helps if you have a photo of the particular machine you wish to model, as this aircraft featured so many numerous small detail differences that it is next to impossible to find any consistency. I guess in the simplest of terms the only consistency I could come up with is total inconsistency!

I wanted a Finnish Curtiss Hawk that was not in post-war markings, had two-tone upper surfaces and did not have the black lower wing. Going through all my decals, I was left with only one option, specifically CU-574 from AeroMaster 48-60 Foreign Hawks. Fortunately, I managed to locate four different photos of CU-574, taken at various stages of its career, which helped to identify some of the details of the airframe.

Like most kits, I started with the cockpit. I found that HobbyCraft has provided a reasonable looking cockpit, albeit a little basic. Before one becomes too critical of HobbyCraft's efforts, remember you get what you pay for and HobbyCraft kits tend to run at 1/3 to 1/2 the price of Tamiya and Hasegawa kits.

I started by removing all the interior details from the fuselage sidewalls, as I would be using the resin sidewalls (photo 1) from the Hi-Tech kit, 48023, for the P-36. As a rule, I do not care for Hi-Tech's resin as I find it chalky, grainy, rough and lacking a sense of refinement. However, it was all I had and none of my local stores (that pass themselves off as Hobby Shops) carry any aftermarket detail sets. I then glued the fuselage halves (parts A1 and A2) together and installed the rear cockpit bulkhead, part C25. I followed this procedure as I wanted to make sure I had the bulkhead perfectly aligned with the upper portion of the cockpit



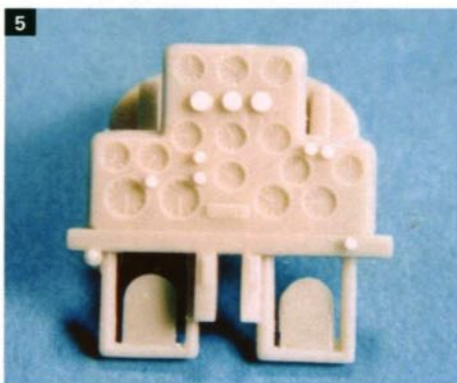
behind the pilot's head. Photo 2 illustrates this step and as can be seen, the joint between C25 and the fuselage halves is filled and once sanded will result in a seamless area behind the pilot.

This is also an excellent time to point out a potential pitfall with the kit. It relates to the installation of the rear quarter glass and I will tell you how to work around it.

If you attempt to install parts D7 and D8 which are the clear parts behind the pilot, they will either fog up and get cloudy from the superglue or liquid cement, or if you use Kristal Klear you will have glue seepage on the inside of the glass. This is almost 100% guaranteed to happen because of the way the mating surfaces are designed.

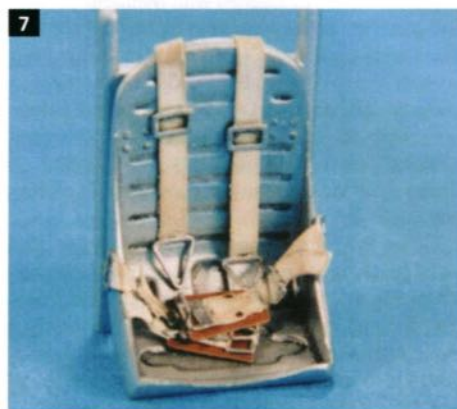
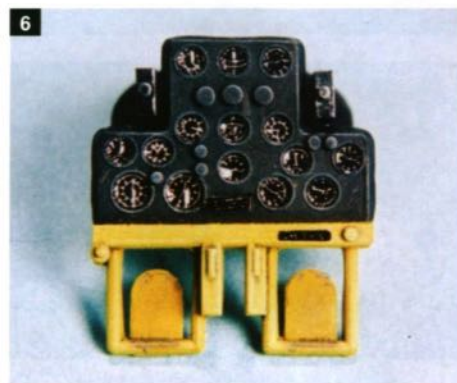
To eliminate these problems, you have to do two minor things. The first is to scribe a deep channel all around the inside edge of the window opening. I used a combination of a sewing needle in a pin-vice and my OLFA P-cutter and I have indicated the resultant scribed channel with a dark line as shown back in photo 2. The second thing to do is thin the inside edge of the clear parts D7 and D8 to at least half their thickness. By performing both these steps you are effectively reducing the surface contact area between the clear parts and the fuselage, whilst also allowing an area for any excess glue to channel away before it works its way up onto the glass. Once you install the clear parts, you can fill any seams and then sand and polish to restore the clarity of the windows. Trust me it works, as illustrated by the finished product in photo 3. You will also notice the addition of a German-style fuel triangle decal, which was applied before the clear parts.

Okay, back to the cockpit sidewalls. The two parts were airbrushed with Testors Metalizer Non-buffing Aluminium, given a black wash and then smaller details were picked out using Black



ject that is discussed frequently on the various modelling websites. Without being dogmatic about it, the general consensus is that the P-36 was built before the introduction of Interior Green paint and was most likely finished in aluminium lacquer, with Chromate Yellow applied to the rudder pedals and floor, which is actually the top of the wing. This is supported by the colour photos of the unrestored cockpit of the US Air Force Museum's P-36 in Dayton, Ohio.

Moving forward, we get to the instrument panel and cowl gun decking, parts C16 and C21

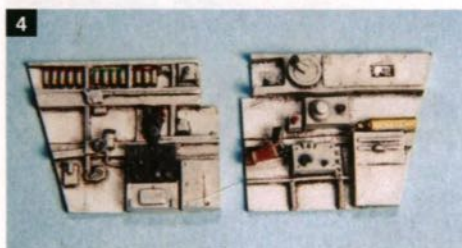


"the general consensus is that the P-36 was built before the introduction of Interior Green paint..."

Chrome, brass for the fire extinguisher and leather and gunmetal for the flare pistol, whilst the row of flares were detailed with red, green and brass. By studying photo 4 you can see how grainy the Hi-Tech resin is if you look at the areas where the black wash has been applied. These parts were fastened to the fuselage halves after the fuselage interior was airbrushed in Non-buffing Aluminium.

Next I tackled part C26, which is the cockpit floor, as it is devoid of any detail. Depending upon which references you look at, the floor could resemble an early P-40, or it could have what appears to be two, wide, shallow U-shaped channels for the pilot's feet, which is what I opted for. I also added strip plastic to represent the prominent joint that runs down the middle and then painted the floor Chromate Yellow and not Interior Green.

The cockpit colour of the P-36 lineage is a sub-



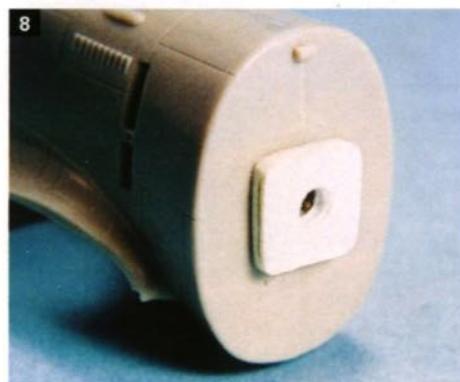
respectively. I had the option of using Hi-Tech's instrument panel, but truth be told, I did not feel that HobbyCraft's was all that bad. It only needed the addition of a few knobs, which I made by punching out disks of plastic using my Waldron punch set (photo 5).

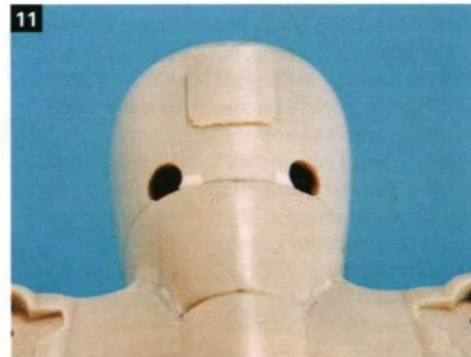
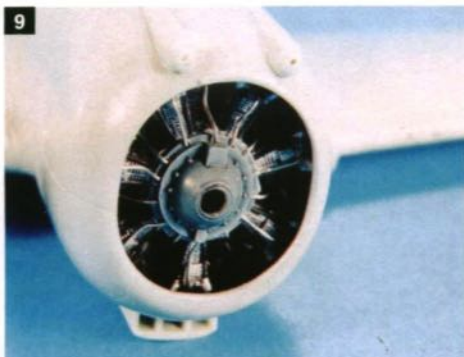
The cowl gun decking has what I assume are gun breeches, but as they are too narrow and are partially hidden behind the instrument panel, I fashioned new gun butts from Evergreen strip and rod styrene. The instrument panel was airbrushed with Testors Black Chrome, whilst the lower part with the rudder pedals was airbrushed with Testors Chromate Yellow and the gun breeches were airbrushed with Testors Gunmetal. Mike Grant instrument dials were applied to the panel and each dial was given a drop of Klear/Future floor wax to represent the lenses. The completed instrument panel is shown in photo 6.

The seat was next to be enhanced. Usually, the seat is the single biggest improvement you can make to a cockpit as for the most part it is all you really look at in the cockpit of a finished model. I had loaded up on a supply of Ultracast's resin seats with both US and Sutton style harnesses, but they would prove useless for this build, as my seat needed to have German-style seat belts. This left me with no other option than to 'liberate' a seat from my Hasegawa P-40E. The

seat was airbrushed with Alclad Aluminium, given a dark wash and treated to set of Eduard photo-etched Luftwaffe seatbelts, which I had painted off-white and dry-brushed with a medium brown. The completed seat is seen in photo 7.

With cockpit finally completed, I was able to get to the assembling of the basic airframe. The first thing I did was to correct the engine mount. The way HobbyCraft has designed the kit the engine will sit too deep in the cowl, resulting in the prop hitting the lip of the engine cowl. This is an easy fix that took a few minutes. I laminated two pieces of .040 styrene together, drilled a hole to match the mounting boss on the back of the engine and fastened the laminated styrene to the front of the fuselage as seen in photo 8.





The engine was painted with Metalizer Steel, and given an India Ink wash to highlight the fin detail on the cylinders. The crankcase was painted with Xtracolor X128 Engine Grey FS 16076, given a black wash and dry brushed with a lighter grey, while the spark plug leads were made from pieces of fine solder. Overall, I think the Hobby-Craft engine looks pretty good, even if it is a little basic, (photo 9).

There is another problem with the engine cowl and it involves the exhaust pipe cut-outs. Hobby-Craft have moulded the openings a little bit 'irregular in shape' and with openings that are too big at the edge of the cowl, as seen in photo 10. I filled the irregular shaped holes with strip styrene and then using a cutting burr in my Dremel, I enlarged the openings to the right size and shape. The results of this are shown in photo 11.

Whilst dealing with the exhaust openings, this is as good a time as any to touch on the exhaust pipes themselves. The Curtiss Hawk I was modelling had the long, unshrouded exhaust pipes, which are not properly supplied by HobbyCraft. I found that a set of the long pipes from the Tamiya Rex had the right basic shape and diameter to work in this instance and all they needed was to be trimmed off to the right angle and hollowed out. The finished pipes are shown in photo 12.

The mainplane was next and if you are lucky it will be moulded with the correct dihedral. I have nine Hawk kits at home and of the nine, four have

the wing moulded with absolutely no dihedral. In this case, you can cut a v-shaped notch into the reinforcing rib (photo 13) inside the bottom, so as to allow some flexibility in raising the wingtips a little.

There are a few other things you need to do to the wings, depending on which variant of the P-36/Hawk 75 you wish to build. HobbyCraft give you a pretty generic wing, meaning there are no gun access panels indicated on the upper surfaces, so you will need to scribe in one or two panels per wing to correspond to the number of wing guns fitted. Interestingly, HobbyCraft give you wing gun ammunition access panels on the underside which you will need to fill in based on the version you are modelling. A little bit of a disconnect there.

Once you get that out of the way though you only need to decide if your Hawk should have the bomb racks HobbyCraft offer, or if they should be removed.

Once the wing is installed, you will have to use some filler at the front, along the bottom, where the wing meets the fuselage just behind the exhaust openings, (refer back to photo 11 to see where the filler is needed). This was by far the worst fitting aspect of the kit. If the wing is installed carefully, you will have no 'body work' to perform along the wing roots.

This is as good a time as any to add the fuel tank drain and vent pipe, as can just be discerned

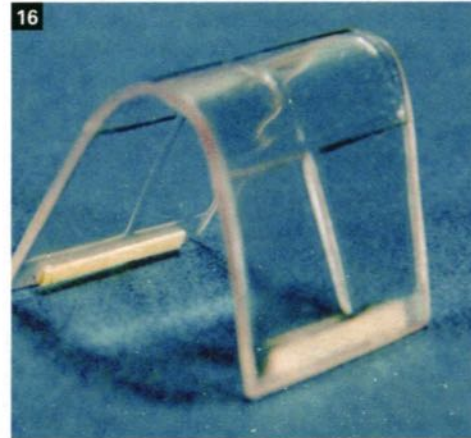
in photo 14. The tailplanes were fastened and fit quite well. However, they are missing the panel lines, so using the scale drawings in the A J Press books, these lines were scribed in.

The clear parts were next and HobbyCraft has made the same mistake as all other kits inasmuch as they have moulded a set of vertical canopy frames on the outside of the windscreen, when in reality, these should be two pairs of metal wires on the inside. This is a relatively easy fix and takes no more than 5 minutes with a scribe.

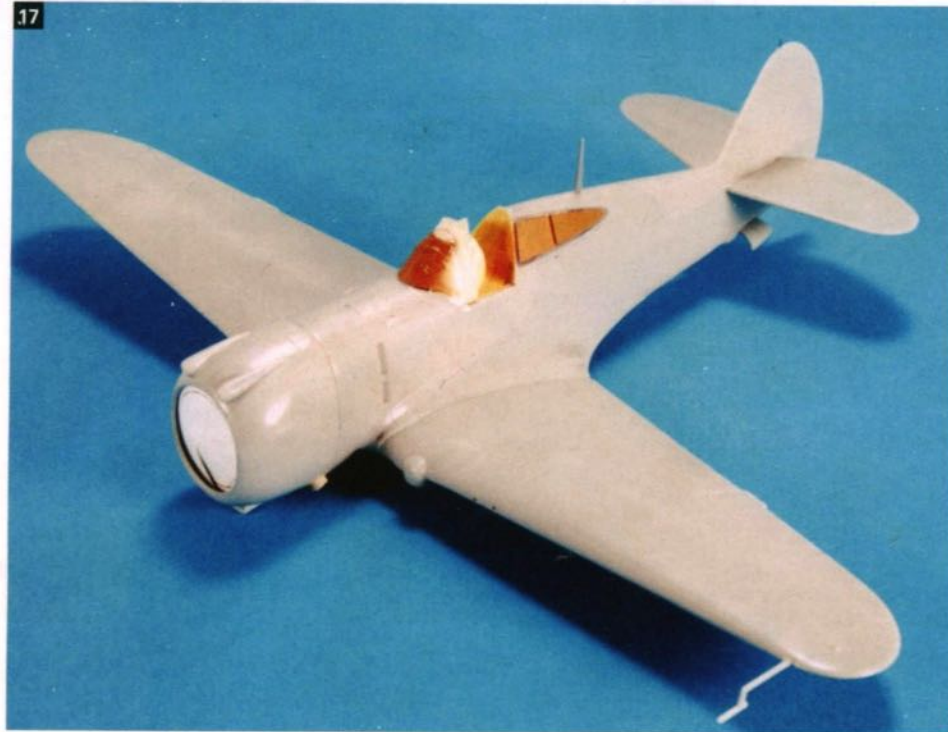
Using the external frames as a locating guide, scribe two sets of parallel lines on the inside of the windscreen. Then, using a sharp pencil, run the lead in the scribed lines. After that, sand off the two frames on the outside and what you have left is the illusion of metal wires on the inside of the windscreen, as can be seen in photo 15.

You will also notice that the windscreen has been blended into the fuselage, resulting in a much neater installation. In the same photo (15), you can also make out the Revi gunsight which was installed, in keeping with the German instruments and seatbelts.

On the topic of the clear parts, the kit's sliding canopy will work quite well with one simple modification: add two thin strips of styrene to the inside edge, near the bottom (see photo 16). These will keep the canopy from sitting too low if installed in the open position. It is ironic that in most models, the kit canopy will sit too high and



17

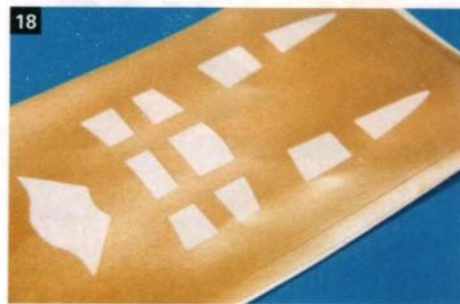


usually needs to be replaced with a vacform copy, but God bless HobbyCraft – they will do the exact opposite.

With the complete airframe assembled, (photo 17), you will notice that next to no filler putty was needed on any of the joints. I cannot emphasize enough the importance of test fitting any kit parts before committing glue to plastic. A little work up front can pay dividends in reduced 'body work'

quently do not allow for the seam to be hidden. So, I made a master set from masking tape to the exact shape I wanted and had the trophy shop scan them and make multiple copies from vinyl. For a sum of \$15.00 (Canadian), I got two dozen sets of masks, which I know will fit perfectly every time, (photo 18). Sure beats paying \$6.00 for a set of two masks which will require trimming to fit.

18



19



represent the replacement one that was fitted to CU-574.

This is a perfect example of how important photos are of the subject you are modelling. In the AeroMaster instructions, they show the rudder as a different shade from the rest of the airframe, but they make no mention of this fact. They also show it having light blue on the bottom, whereas the wartime photos clearly show it with a solid darker colour all the way to the bottom. Also missing from AeroMaster's artwork are all the small patches from previous damage and repair.

The rudder and yellow areas were masked off and then the under surfaces were airbrushed with Xtracolor X127 Blue FS15414. For the upper surfaces, I used a combination of X155 B-52 Dark Green FS14096 and Testors Model Master Gloss Black. Particular things to note in photos 19 and 20 are how the upper and lower camouflage demarcation line is different from one side to the other and the very high gloss finish you can obtain with Xtracolor paints. These images were taken before I rubbed out the finish to obtain a glass smooth surface devoid of any specks of dust.

The decals were next to go on and as was the norm with the older AeroMaster decals, they were printed by Micro Scale and performed flawlessly. The German-style oil and fuel filler triangles were 'liberated' from some older decals featuring Luftwaffe subjects.

Once the decals were in place, I created a template of the rudder area from a paper index card, drew in the location of the white '4' and then proceeded to cut irregular shaped openings in the areas that correspond to the patches on the rudder as seen in the wartime photos.

The template was held in place against the port side of the rudder and Xtracolor X155 Green was sprayed through the holes. The template was then reversed for the opposite side and the exercise repeated... as I surmised that whatever had hit the rudder stood a good chance of going all the way through the fabric and exiting on the other side.

"A little work up front can pay dividends in reduced 'body work' later on in the construction"

later on in the construction. Also shown in the photo are the canopy masks which I had made by my local trophy and engraving business.

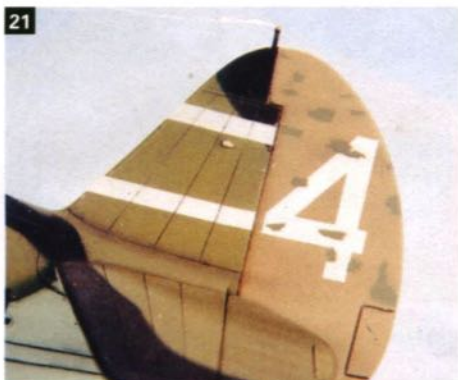
I have found that most canopy masks are designed to go right to the edge of the clear part in applications where there is a window which gets inserted into an opening such as the P-40B/E, Dewoitine D.520 and the P-36, and conse-

Hawk 75A-2 of Hvittajalentolaivue 32, based at Nurmoila, Russia, February of 1944

Now I was at the stage which I loathe, namely painting. First, I airbrushed Xtracolor X106 Insignia Yellow FS13538 on the nose, fuselage band and underside of the wingtips. Next, Xtracolor X113 Faded Olive Drab was mixed with X201 RLM Grau 02 and applied to the rudder to

20





The completed rudder is shown to good advantage in photo 21, whilst the model, after the application of small amounts of chipping and a darker panel line wash, is illustrated in photo 22. At this stage all that remained was to install all the small bits laying around and apply some chalk pastel weathering, paint the navigation lights and add the stretched sprue antenna wires.

The remaining photos provide a bit of a walk-around of the completed model. There were many other small details that I added and numerous corrections or enhancements performed on this model, but to list them all may only serve to put you to sleep...

Usually when I build a model, whether it be major or minor, invariably something goes wrong and causes a setback. In this case, I can't recall any problems! I may have had more things to do, but nothing that wasn't anticipated in advance. The finished product now ranks as one of my most satisfying and favourite models to date.

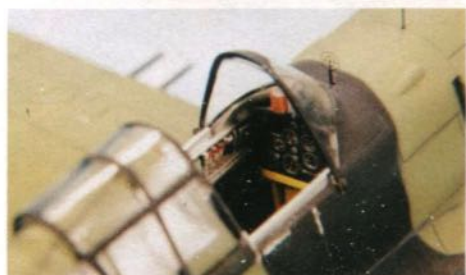
It is not a 'shake and make' kit. To build it means you will need to use some of your (possibly dormant), modelling skills, but I can tell you that I had a greater feeling of accomplishment with this kit than I have had with several recent state-of-the-art Tamiya and Hasegawa kits. **MAM**



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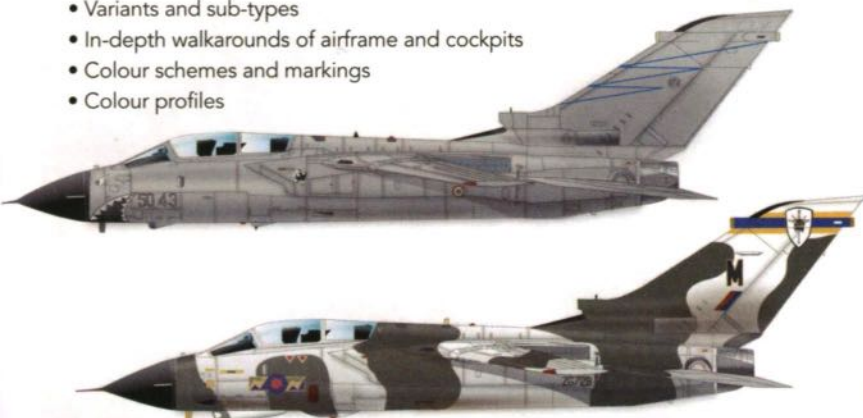
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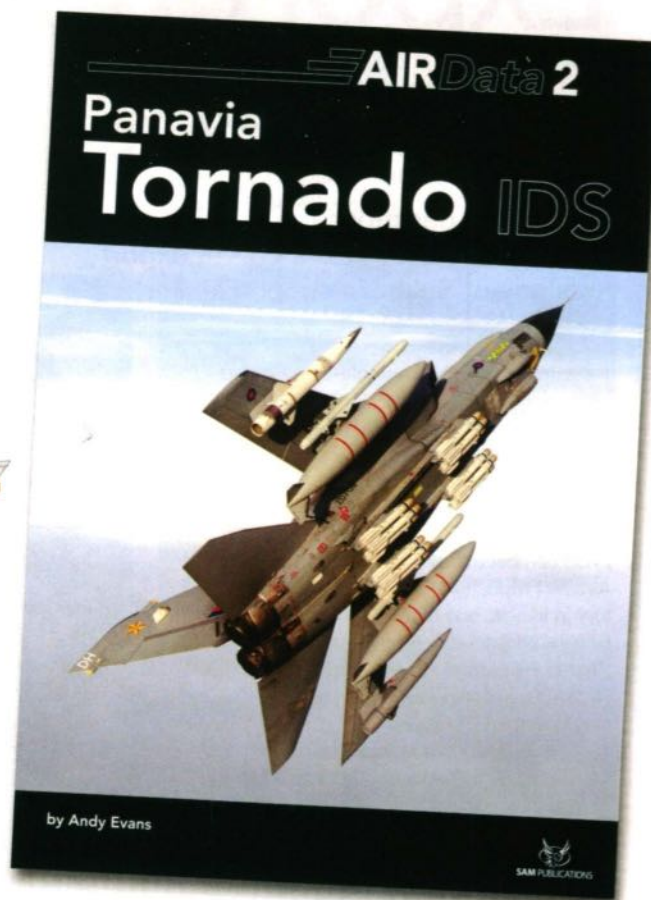
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Export Flankers

Ken Duffey describes the development of the Su-30 and models a pair of export versions of Sukhoi's super 'Flanker'...

The Sukhoi Su-27 single-seat Flanker entered service with the Soviet VVS in 1982. Its two-seat trainer derivative, the Su-27UB, first flew on 7 March 1985 and entered service with the VVS a short time later.

In Soviet times, the tandem two-seat Su-27UB combat trainer was built at the Irkutsk Aircraft Production Association (IAPO) factory in Irkutsk, one of the largest cities in Siberia, whilst the Komsomolsk-na-Amur Aircraft Production Association (KnAAPO) in south-east Russia built the single-seat Su-27 fighter.

The Su-27UB trainer was gradually developed by Sukhoi and IAPO into a full-blown, multi-role, two-seat fighter via the Su-30 and Su-30MK into the Su-30MKI for the Indian Air Force. Incidentally, the Su-30MKI designation stands for Modified (ie upgraded), Kommercheski (Commercial, ie Export) with the suffix I meaning India.

The Su-30MKI incorporates Russian, Indian and Israeli avionics fitted into a revised airframe with canard foreplanes and thrust-vector control (TVC) engine nozzles fitted to the Lyulka AL-31FP engines. Other airframe changes to the baseline Su-27UB trainer are the inclusion of a retractable in-flight refuelling (IFR) probe on the port side of the nose, which necessitated the relocation of the Infra-Red Search-and-Track (IRST) equipment from its central position on the windscreen, to the starboard side.

A new nosewheel leg, with twin wheels to take the increased weight, was incorporated and an additional pair of pylons was fitted under the wings. The chord of the rudders was also increased to restore control authority.

Following the break up of the Soviet Union, IAPO gained some independence from the Sukhoi OKB and started to 'go it alone' with developments of the Su-30MKI and signed a lucrative contract with the Indian Air Force.

In the meantime, the Chinese Peoples Liberation Army Air Force (PLAAF), having bought single-seat Su-27SK fighters from KnAAPO, was also interested in a two-seat, multi-role variant, but for political reasons, could not purchase the IAPO design, so they turned to KnAAPO – who then proceeded to create their own two-seater.

This was an entirely different machine to the Su-30MKI, without canards and TVC nozzles. It had bigger fins with integral fuel tanks, inherited

from the KnAAPO-designed Su-35, and avionic systems of Russian and Chinese design.

Dubbed the Su-30MKK, (Modified, Kommercheski, Kitaiskiy – the Russian word for China), the aircraft entered PLAAF service in late 2000 and has since been adopted by the Chinese Navy (PLANAF) as the Su-30MK2; Vietnam (Su-30MK2V); Venezuela (Su-30MK2V); and Indonesia (Su-30MK).



The Heller Su-27UB and Alanger Su-30 box tops and kit sprues

In the meantime, IAPO have sold their variant, (with different avionics), to Malaysia as the Su-30MKM and to Algeria as the Su-30MKA.

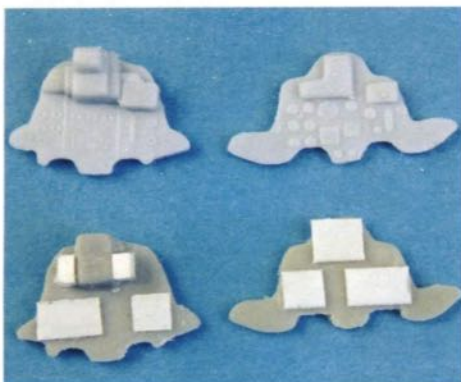
So there are now two distinct 'flavours' of multi-role, two-seat Flankers emanating from rival production lines – the IAPO Su-30MKI/MKM/MKA and the KnAAPO Su-30MKK/MK2/MK2V/MK...

Modelling the Su-30MKI/MKM

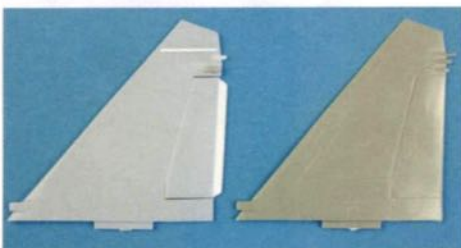
I have wanted to add an Su-30MKI to my collection for a long time and then when I saw some photographs on the internet of the delivery ceremony at Irkutsk of the new Malaysian Air Force Su-30MKM, it prompted me to build both variants at the same time.

To date there is no kit of these versions available – in fact there is not one single 'state-of-the-art', accurate, kit of any Flanker variant in any scale! They all have their faults and, in 1/72 scale, 'the least worst' is the Airfix Su-27 single-seater and the Heller Su-27UB trainer.

These kits are, essentially, the same – with different parts in the Heller kit for the two-seat cockpit, upper fuselage and dorsal airbrake and bigger fins. Unfortunately, both kits are out of production, although the moulds have been sold to a Ukrainian company called Alanger – who have reissued the Heller Su-27UB as a 'Su-30'.



The reworked instrument panels – later redone with decals



... and the modified port fin – including strengthening strip



Both kits needed lots of filler around the LERX and radome...

The good news is that another Ukrainian company – ICM – are updating the Alanger moulds and are reissuing the Su-27.

As I have quite a few boxes of Heller's Su-27UB in my stash, I decided to use one of those plus a recently purchased Alanger Su-30 as the basis for my conversions.

Cutting Plastic

The most obvious place to start is in the cockpit. There are plenty of published photographs of both the Su-30MKI and MKM on the internet, so I started there.

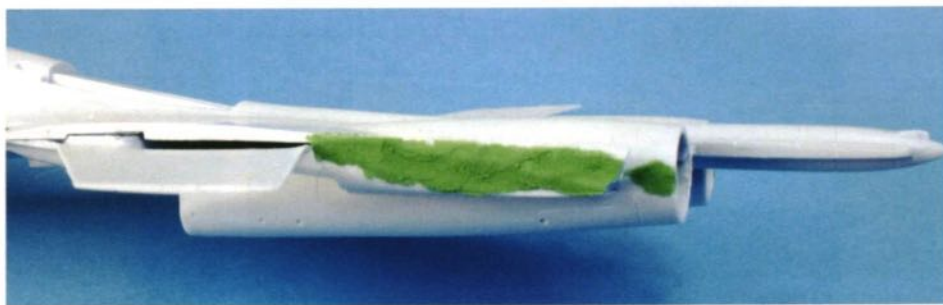
The main difference between the old style Su-27UB cockpit and the new 'glass' cockpits is the replacement of the dials with three 5 inch x 5 inch



The areas of the leading wing root extensions, (LERXs), cut away for the canards



The cockpit tub in place – with MFDs from black decal sheet



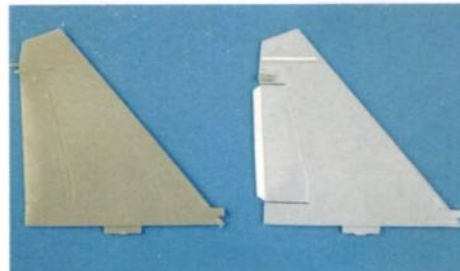
...and around the rear joints

black decal sheet – which I felt was adequate in 1/72 scale.

The mountings for the canards were tackled next. Triangular sections were cut from the upper fuselage moulding starting approximately halfway along the rear cockpit to a point in line with the dorsal airbrake.

The fins need some attention. After deepening the moulded groove at the front of the rudder to give it more definition, sawing through the top and bottom of the rudders to replicate the gap seen on the real thing and cutting and drilling out the intakes on the leading edge, the trailing edges of the rudders were sanded flat to provide a key for the plastic card extensions.

All the other moulded-on trailing edge protu-



The modified starboard fin – with extended rudder and RWO antenna – (Su-30MKM only)...



Su-30MKM at top and Su-30MKI bottom – note the different recesses for the IFR probe

is no positive mounting for the kit stabilisers, I added brass rod 'pivots' and extended the curved actuator covers with pie-slice shaped piece of plastic card to cater for the drooped position.

The cockpit tub was painted pale grey with decals from the spares box being applied to the side panels to represent the instruments – adequate in this scale, unless you want to really super-detail. The revised instrument panels were added and the whole assembly was fitted into the upper fuselage moulding, after which the lower



The area cut away for the canard shoulders...

fuselage section was carefully cemented into place and the nose cones added.

It was at this point that I realised I should have made the IFR probe recesses BEFORE I cemented the fuselage halves together – so I had to gouge out the openings with a sharp scalpel blade – taking care not to cut all the way through the plastic.

I had decided to make one probe extended and one retracted – so the retracted one had a plastic card cover added.

No kit of these versions is available – in fact no 'state-of-the-art' Flanker variant is available in any scale!

MFD screens on both the pilot's and WSO's panels – with the addition of a central 6 inch x 6 inch MFD screen for the rear seat WSO.

Using the kit's instrument panels, I scraped off the raised dials and fitted a rectangle and a square of thin plastic card to both panels – with a larger plastic card square above on the rear panel. The pilot's panel had a couple of plastic card 'boxes' added on either side of the moulded central 'box'.

I later decided that the plastic card MFDs were too large and replaced them with squares cut from

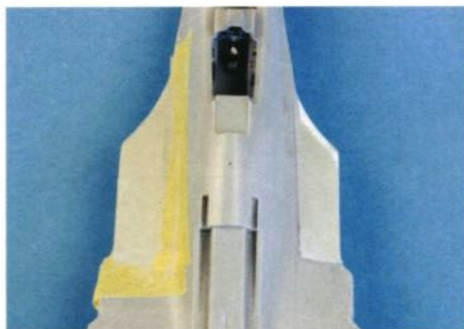
berances were removed – but I left the raised moulding on the starboard fin as it is present on both versions I was modelling.

Both fins have a more prominent strengthening rib across the top, and unique to the Malaysian MKM are two Radar Warning Receiver (RWR) antenna – made from plastic rod. I also added a new navigation light inset into the trailing edge of the port fin.

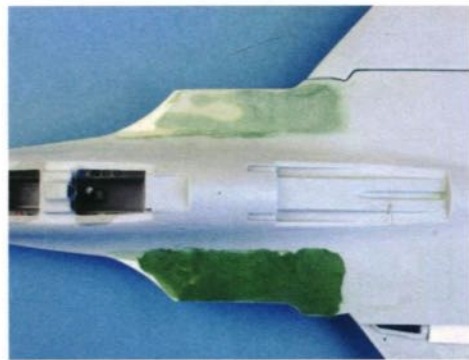
The horizontal stabilisers are usually drooped, trailing-edge down, on a parked Flanker. As there



...which were added using thick plastic card cut to shape



The new canard shoulders were blended in with Milliput. Note the tape to protect the plastic



More filler was used on the upper surfaces...



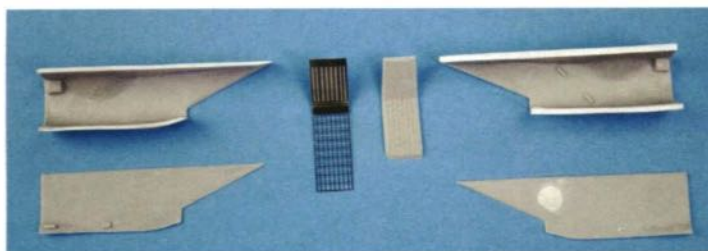
...and the under surfaces before I got everything smoothed-in



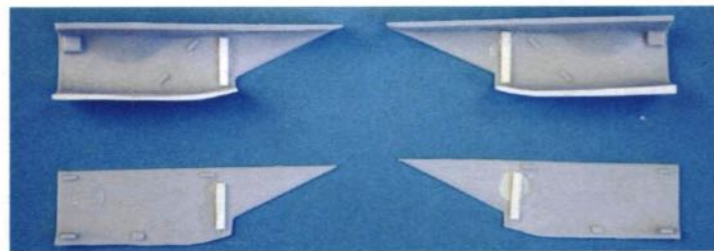
A quick coat of Halfords Grey Auto Primer to make sure it was all blended in – on top...



...and underneath



The Hasegawa kit's etched FOD guard (left) compared to the kit's plastic version (right). Note that the intakes have been widened with plastic strip along the mating surfaces.



Intakes for the Su-30MKI with ledges for the blanking plates

Although the Airfix and Heller Flankers are very accurate in outline, they require lots of filler on most of the joints – as can be seen from the accompanying photographs.

Building the canards

The canard foreplanes are mounted on substantial 'shoulders' that extend forward from the wing-roots. These extensions are made from two shapes cut from thick plastic card cemented to the cutouts made earlier. The whole shoulder is then blended in to the wing Leading Edge Root extension (LERX) and fuselage sides using Milliput.



The leading edge slats and trailing edge flaperons were removed from the Su-30MKI's wings. The resin replacement wingtip launch rail was fitted to both versions

To avoid damaging the moulded detail and in particular the starboard 30mm cannon, I placed Tamiya tape over the engraving before applying the Milliput and later sanding it down. My first lot of Milliput wasn't quite adequate, so I resorted to Squadron 'Green Stuff' filler to finish off the blending in.

A couple of sessions of filling, sanding, applying grey primer etc followed before I was happy that I had got a seamless join between the new shoulders and the rest of the model.

The movable canard foreplanes were simply cut from thin plastic card, shaped to airfoil section and mounted on brass rod pivots that fitted into corresponding holes drilled into the shoulders ready to be fitted in place at the end of construction.

Intakes

To ring the changes, I wanted to make one set of intakes 'open' with the other set closed off with red blanking plates to add a splash of colour.

The Flanker employs an anti-FOD system that has a mesh screen fitted into the bottom of the intake trunking. When the engines are started and there is weight on the mainwheels, this mesh screen, hinged at the rear end, rises up and 'blanks off' the intake.

This mesh screen is moulded as a solid piece of plastic by Heller, but the Hasegawa kit of the Su-27, whilst being less accurate in outline, does have some very nice detail – including an etched brass anti-FOD screen, so I elected to display one of my models with the mesh screen raised – not strictly accurate on a Flanker at rest with its engines shut down, but I thought it looked interesting...

The Hasegawa etched steel mesh screen is slightly too wide for the Heller intakes, so they were widened by adding a thin sliver of plastic card along the mating surface before cementing

the two halves together. This slight widening is also beneficial when it comes to fitting the intakes to the engine trunking – less filler is needed to blend them in.

After painting the insides of the intakes, the etched screens were superglued in place in the deployed (raised) position blanking off the intake.

The other 'closed up' intakes had the same widening applied – but before cementing them together, I fitted lengths of plastic card cemented vertically just behind the intake lip to provide a ledge for the blanking plates that were fitted later – unusual for me to be thinking ahead!

Wings

Again, to be different, I made one set of wings with the leading-edge slats and trailing-edge flaperons deployed – with the other set having them all retracted.

Both wing sets had the inaccurate wingtip missile launch rails replaced with resin copies of the excellent Hasegawa items. Neither variant is normally seen with underwing missile launch rails – it is only in publicity photos that you see all twelve pylons fitted, so I just added the outboard set – again using the Hasegawa parts.

Windscreen andIRST ball

The Heller kit includes a nicely moulded canopy with a separate windscreen, but this has the centrally-mountedIRST ball moulded onto the windscreen, so it had to be removed. If done carefully, theIRST moulding can be cut and scraped away,

leaving the windscreen intact – all that is needed is to sand and polish it back to clarity and dip it in some Johnsons Klear (Future) to restore the shine.

A new IRST ball, offset to starboard, was made from a thick section of clear sprue sanded to shape to fit the windscreen. It was mounted on a small platform that has a flat top and is blended into the fuselage nose just ahead of the windscreen.

I also made another small alteration to the kit windscreen to mount it higher on the moulded coaming. I have found in the past when making the Airfix/Heller Flanker that the windscreen is such a tight fit over the coaming that capillary action causes the liquid cement, (or paint), to be sucked up inside the windscreen creating a nasty smear.

By adding a curved slice of thin plastic card to



The Malaysian Air Force Su-30MKM, finished as serial M52-01

"A new IRST ball, offset to starboard, was made from a thick section of clear sprue sanded to shape..."

the fuselage where the base of the windscreen attaches, it is raised off the coaming – and the appearance is improved as a bonus.

The coaming itself was modified with addition of some detailing such as the HUD bracket, demister ducting, some cabling and, for the Malaysian Su-30MKM, a small instrument to the right of the HUD. A small repeater HUD is mounted on the WSO's coaming.

The Indian and Malaysian HUDs differ – the MKI has a clear glass, the MKM is green tinted.

Both variants have retractable spotlights fitted on both sides of the nose, just behind the radome, to illuminate the IFR probe and drogue during refuelling. I added these lights using thin pieces of plastic card cut to shape.

Just to make the two models even more different, I modelled the Indian Su-30MKI with the dorsal airbrake closed and the Malaysian Su-30MKM with it deployed in the open position.

The MKI required quite a bit of filler to blend in the closed airbrake with the spine, the MKM was easier – I just replaced the hydraulic section on the operating ram with a length of aluminium tube. The inside face of the airbrake is usually a pale tan

colour; the recess in the fuselage is the same colour as the rest of the airframe.

Changes specific to the Malaysian Su-30MKM

When the Malaysian Air Force – TUDM – ordered the Su-30MKM from IAPCO, they requested that the Israeli-supplied avionics fitted to the Indian Su-30MKI be replaced.

SAAB Avionics was the chosen supplier and they provided a new suite of sensors consisting of a Missile Approach Warning System (MAWS-200) and a Laser Warning System (LWS-310). The former is mounted in two multi-faceted 'pyramids' – one on the spine just behind the dorsal airbrake, the other under the nose in front of the nosewheel well.

The laser antennas are fitted in four positions – two on the outside of the intake trunks facing rearwards with another two fitted under the nose, just in front of the MAWS turret. There are also four Russian-supplied RWR antennas – two on the outer fins dealt with earlier – and another two let into the leading-edge slats. I made the

MAWS-200 pyramids by carving the shapes from modelling wood.

Three thin plastic card antennas were added – giving the 360deg coverage. The LWS-310 aerials were carved from plastic card and the RWR antenna is plastic rod let into the slats about halfway along their span.

One final addition to the Su-30MKM is the 'bird slicer' IFF aerials in front of the windscreen – simply made from four short lengths of plastic card.

Thrust Vectoring Nozzles

TVC nozzles are fitted to the engines of both machines and when at rest they adopt a downwards and inwards position. I originally used the Heller nozzles, but they are in the closed up/idle position and not the fully open position as seen on a Flanker at rest.

I used four spare nozzles from the Italeri Su-27 kit which fit the bill perfectly – with some modifications. The nozzles are longer on the TVC engines – so the rear ends of the engine nacelles were scribed to represent the structure and the rear faces were chamfered to make the nozzles droop.

A circular ring was added to the fronts of the Italeri nozzles which were again chamfered



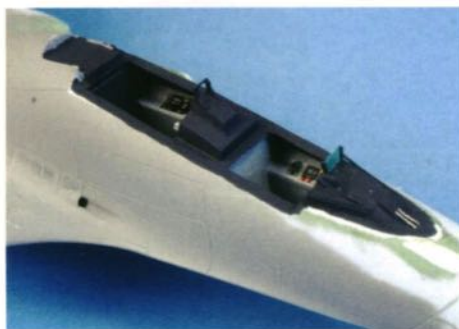
The windscreen was modified by careful removal of central IRST ball



...and painted. This is the Indian Su-30MKI



Platform for the IRST ball and shim to raise height of windscreen



Note the Malaysian Su-30MKM's prominent green HUD



Detail and HUDs were added...



The MAWS-200 turrets were carved from plastic wood...



...and fitted in place on the spine. The three antenna faces are made from thin plastic card



The underside MAWS turret – together with two forward-facing LWS-310 antennas



The rear-facing LWS-310 antenna on the intake sides



The new offsetIRST ball and retractable searchlight



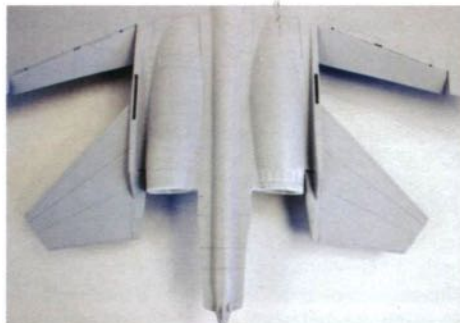
The Su-30MKI ready for painting



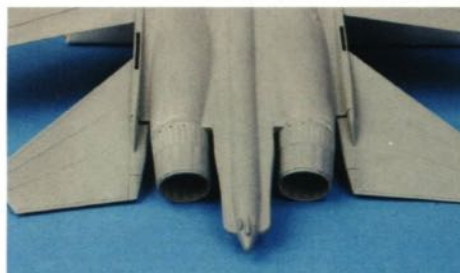
Underside view of the Su-30MKI showing all the mods



The 'Bird Slicer' antenna on the Su-30MKI



Rear end of engine nacelles modified for the TVC nozzles



The TVC nozzles from the Italeri kit mounted in the 'inward droop' position

to provide the right degree of inwards and downward droop. It's all a bit 'Heath-Robinson-ish' but with careful painting, it looks okay in this scale.

Stop Press! There is no longer any need to rob the Italeri Flanker kit for the exhaust nozzles! Aires have just released a resin exhaust set to fit the Italeri kit. They are also perfect for the Heller/Airfix/Alanger kits. You still need to 'convert' them into TVC nozzles of course, but they are better than the Italeri originals. They are available from Hannants – www.hannants.co.uk/search/?FULL=AIRE7207

Undercarriage

The mainwheels on the Heller kit are rather simplified – the real things have lots of intricate detailing on the inner side of the wheel hubs with brake hoses and cylinders.

Adding the detail is easier with the mainwheels detached, so I fitted a backplate from an old etched brass MiG-21 detailing set and fitted scratchbuilt cylinders and piping to that. The centre of the inner wheel hub had to be sanded back to accommodate the brass backplate.

Incidentally, the kit mainwheels represent the early-style hubs with a cross in the centre – the later-style hubs on the Su-30MKI & MKM have a series of cooling holes for the brake discs. The Russian firm of Equipage make a correct set of mainwheels with the cooling holes but, as I had none to hand for this build, I had to use the incorrect kit wheels.

The nose undercarriage requires some changes to make the twin-wheel assembly used by MKI and MKM.

I first removed the short stub from the bottom of the kit leg and drilled out the leg to fit a short length of aluminium tube to make the oleo section. A new levered-suspension arm was cut from a suitable piece of sprue – to which was added a plastic tube axle and a scissor link cut from a piece of thin plastic card. A length of brass rod was then used to connect the suspension arm to the leg and new twin wheels were sourced from the spares box.



Underside view of the Indian Air Force Su-30MKI

After adding some brake pipes and other detail, the leg was painted and the pre-painted wheels were attached ready for the anti-FOD mud-guard. This is quite a complicated structure with side panels and four horizontal slats, but with care and patience, can be made.

The side panels and centre support are cut out and added first – the side panels directly to the wheel, the centre support to the axle between the wheels with a plastic rod support arm attaching it to the leg. The top and bottom slats are carefully cut out from thin plastic card and added – followed by the two centre slats and finally a short length of plastic tube for the axle end completes the assembly.

Painting and Decals

With everything assembled, the two airframes were given a wash in warm soapy water to remove dust and finger marks and when dry, were prepared for painting.

The engine nacelles were painted first – with various shades of dark metallic silver. The TVC nozzles are also dark metallic with a ring of lighter silver over the translating cowl section. The insides of the nozzles are off-white.

The Indian and Malaysian Flankers have large areas of dull silver-grey on the bottom of the engine nacelles extending forward to the bulged fairing of the undercarriage locking mechanism and including the rear part of the aft undercarriage doors.

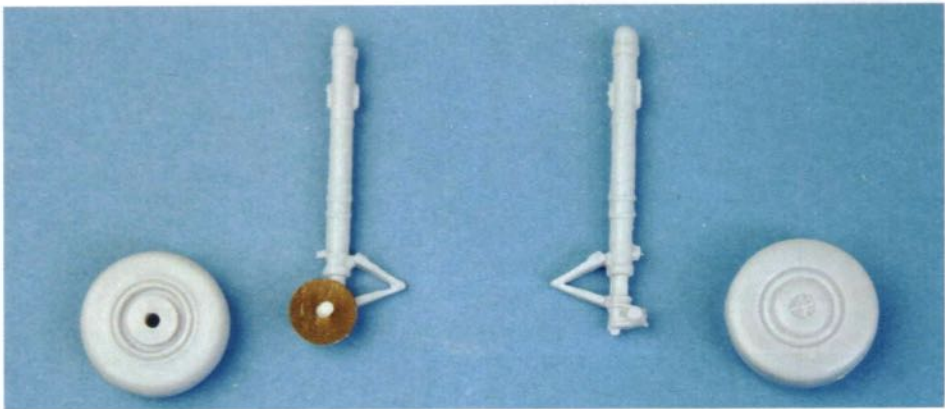
There are also strengthening plates under the

outer sections of the horizontal stabilisers and large gun blast panels on the starboard side of the nose – so these areas were painted dull silver.

Su-30MKI

I planned to use the excellent 'Su-27 Flanker Family (1)' decals from the Russian company of Begemot. As well as providing decals for an early Indian Air Force Su-30MK-1 in Russian-style colours and a 50th Anniversary Su-30MK-1, the sheet includes markings for a later Su-30MKI coded SB 024.

The Begemot instructions are very comprehensive and include full colour and camouflage notes – quoting FS 25237 Dark Blue/Grey for the airframe and FS 26320 for the radome and other dielectric aerals.



The mainwheel legs being modified with added detail

"The Heller mainwheels are rather simplified – the real ones have lots of intricate detailing..."

My colours chart lists these two as equating to Humbrol HU 145 and HU 128 respectively, so those colours were airbrushed on.

Because I had photographed the IAF Su-30MKI's at both Waddington and Fairford, I wanted to model one of those machines – and as luck would have it, one of them was coded SB 042, so it was a simple matter to swap around Begemot's SB 024 codes.

The Su-30MKI has a black anti-glare panel in front of the windscreen that extends back along the lower canopy sills to a point in line with the rearmost canopy arch.

Su-30MKM

For the Malaysian Su-30MKM, I had a decal sheet from VFA Productions for a TUDM MiG-29 Fulcrum that included some speculative numbers for the then undelivered Flanker.

Fortunately, VFA got the numbers right and they matched up with photographs of the real Su-30MKM when it was rolled out at Irkutsk, so I was able to use those.

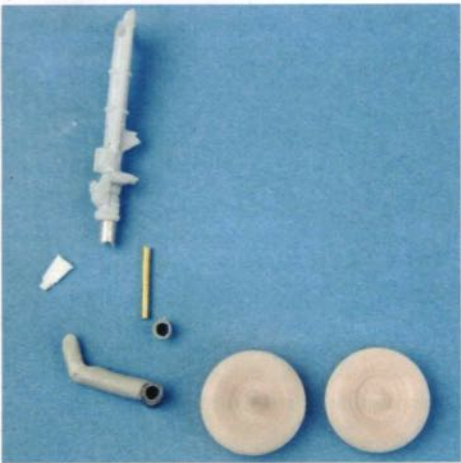
The decal sheet quotes a colour of 'Air Superiority Grey' and close to FS26173 – which equates to HU 156. I thought that it looked a bit too dark, so in the end I settled on the lighter grey of HU 165 with a slightly lighter radome and darker dielectric panels on the fin tips and leading edge.

The TUDM also paint their Flankers with a

black anti-glare panel, but it differs from the Indian machine because it extends over the whole canopy frame.

The TUDM Su-30MKM is also fitted with electroluminescent formation lights – known colloquially as 'Slime Lights' – to the fin, forward fuselage and wingtip missile rails, similar to US machines. The VFA sheet includes some of these, but they are just yellowish rectangles without the black surrounds seen on the MKM. There are some 'slime lights' included on various decal sheets, but I haven't found a generic decal sheet specifically for them – so I had to make my own.

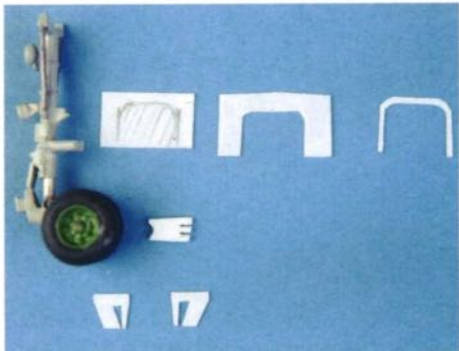
I tried painting a clear decal sheet with the base yellowish colour and added the black surrounds using a pen with a thin tip and waterproof ink – but it wasn't very successful. In the end I used black decal stock as the surrounds, cut slightly larger than the inner yellow rectangles, which worked okay.



Components of the scratchbuilt twin nosewheel configuration



The new twin nosewheel on the left, with the kit original at right



Sequence of making the intricate anti-FOD guard: (a) the components cut from thin plastic card...



... (b) the centre and side panels attached...



... (c) the top and bottom slats added...



... (d) followed by two centre slats



Su-30MKM showing 'bird-slicer' aerials offset IRST and retracted IFR probe



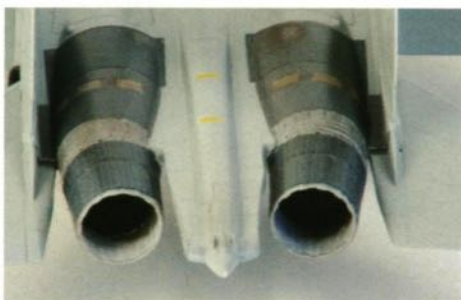
Su-30MKM MAWS antenna on the spine



Su-30MKM fin showing RWR antenna and home-made 'slime lights'



Wingtip 'slime lights' and R-73 training round



The rear end of the Malaysian Su-30MKM...



...and the same area on the Indian Air Force Su-30MKI. Note the white 'golf ball' RWR antenna



Underside view of the Malaysian Su-30MKM showing the rear-facing laser warning antenna



The nose underside area of the Malaysian Su-30MKM with the MAWS and LWS antenna



Malaysian Su-30MKM nosewheel and red-painted intake covers



Indian Su-30MKI was modelled with the IFR probe extended



The mesh intake screens on the Su-30MKI



Looking down the Indian Air Force Su-30MKI intakes



Added brake pipe detail on the Indian Air Force Su-30MKI starboard mainwheel leg



Indian Air Force Su-30MKI, serial SB 042

Finishing Off

The Su-30MKI had its extended refuelling probe fitted, (borrowed from the Italeri Su-34 kit), and both machines had their undercarriages and doors added. The outer wing launch rails were added to both machines – this seems to be a standard fit during peacetime missions.

One small observation about the nose undercarriage door that I didn't notice until later... The Su-27 and Su-27UB are equipped with a single nosewheel and the inside face of the nosewheel door is dished to accommodate it when retracted.

The Su-30MK series of aircraft have twin nosewheels, and the inside face of the nose door has



Indian Air Force Su-30MKI, serial SB-042



Indian Air Force Su-30MKI, serial SB-042



The finished Malaysian Air Force Su-30MKM, serial M52-01

two different shaped indentations – see the accompanying photographs of the real thing. It is only a minor point, but worth pointing out – particularly if you plan to do this conversion in a larger scale.

Finally, the airbrake on the Su-30MKM was attached in the raised position and I added two R-73 missile training rounds, (as denoted by the three black stripes), to the wingtip launch rails – as shown in the photos of the roll-out ceremony at Irkutsk.

There you have it – two models of the latest variant of the Flanker.

The same alterations could be applied to the Algerian Su-30MKA, but there are few published photos released so far showing details of the avionics fit and the camouflage pattern – so a Su-30MKA will have to wait.

I just hope that when Trumpeter release their long-promised 1/72 scale versions of the Su-27 and Su-27UB they get them right, if not, our only hope is the upgraded Airfix kit announced by ICM. **MAM**



Indian Air Force Su-30MKI, serial SB-042



The finished Malaysian Air Force Su-30MKM, serial M52-01

References

- The Russian website Pilot.Strizhi has some good roll-out photos of the Malaysian Su-30MKM – including cockpit shots...
- [HYPERLINK](http://pilot.strizhi.info/2007/05/27/3776)
"http://pilot.strizhi.info/2007/05/27/3776"
- [HYPERLINK](http://pilot.strizhi.info/2007/05/27/3796)
"http://pilot.strizhi.info/2007/05/27/3796"
- A Google search for images will also turn up some good reference photos.
- For the Indian Air Force Su-30MKI, 'Model Aircraft Monthly' Vol 6 Issue 8 – has an article about the Indian AF-Su-30MKI's participating in exercises in India and the UK.

There is also an excellent booklet titled 'Sukhoi Su-30 Flanker in Indian Service' published by The Aviation Bookshop – ISBN 978-0-9559597-0-7. And now another new book, 'Indian Air Force in the United States' by Kedar S Karmarkar about No 20 Squadron's participation in Red Flag 2008-04, available from The Aviation Bookshop – see review in last month's 'MAM'.

Begemot Decals can be found at:-
<http://begemotdecals.ru/index.php?lang=2>



The Harrier lineage is evident here as the AV-8A taxis awaits its next mission

American Harrier

In the second of his four-part series, Andy Evans continues the story of the Hawker Harrier in United States service...

Part Two: AV-8A – 'The VSTOL Warriors'

The US Marine Corps had taken a keen interest in the British Harrier programme almost from its inception, since they themselves had a firm requirement for organic air cover for their amphibious operations.

Rotary-winged aircraft had proved inadequate for their needs, but VTOL or STOVL was high on their 'wants list'. It is somewhat surprising therefore that the Marine Corps played no part in the Tri-Partite Kestrel Evaluation Programme, and the US Army had dismissed the Harrier as not being suitable for the roles they envisaged.

As related last month in Part One: 'The X-Men', when the Tri-Partite Kestrel Evaluation trials had ended, six Kestrels were shipped to the USA and redesignated as the XV-6A. In 1966 an XV-6A operated from the USS Raleigh, a vessel clearly too small to handle conventional fixed-wing aircraft and showed how the Harrier, (as it would become), could perform from such a platform.

The Kestrel, not being a combat aircraft, was seen as a 'good concept' but not one that could actually carry a useful warload, and it was not until the emergence of the far superior Harrier that the US Marines again took any notice.

There were many schemes proposed by American manufacturers to provide an indigenous VTO-capable craft, but in 1968 the only substantial programme on the table was the Harrier.

Despite the positive praise given to the Har-

rier, there was clear opposition to the USA's armed forces purchasing a 'foreign' aircraft at the expense of its own aerospace industry, and the popular criticism seemed to be that 'the Harrier couldn't carry a matchbox over a football field'. Against this background of hostility, General G McCutcheon of the USMC sent a team to the 1966 Farnborough Airshow.



A Harrier is readied for operations



AV-8A Harrier 159703 with 'Day-Glo' orange panels on the wings and tail. This aircraft was lost in an accident whilst aboard the USS Tarawa in 1981

Amongst their number were two test pilots, Col Tom Miller, and Lt Col Bud Baker. On finding the Hawker Siddeley chalet they asked if they could be permitted to test fly the Harrier, and the rest, as they say, is history...

Their reports on the potential of the aircraft gained support from the Commandant of the Marine Corps who lobbied heavily on Capitol Hill until he eventually gained Congressional and Presidential approval for a first purchase of twelve Harriers, sacrificing seventeen new F-4J Phantoms in the process. To facilitate the move, a deal was struck between Hawker Siddeley and McDonnell Douglas to manufacture and maintain the Harrier.

To get the feel for operational flying, test pilot Major 'Bud' Iles and maintenance officer Captain 'Speedy' Gonzales were sent to the UK to learn from No 1(F) Squadron who were operating the Harrier GR.1, to which the American aircraft would be closely allied.

AV-8A Harrier 159254/6 of VMA-512 'Det-A', November 1976

The aircraft wears the standard British colour scheme of Dark Green (BS381C: 641) and Dark Sea Grey (BS381C: 638) upper surfaces in the standard pattern with Light Aircraft Grey (BS381C: 627) under surfaces. Serial number and codes are black. Note the non-standard medium blue rudder with white stars and the medium blue tail code and nose number and toned-down national markings.



AV-8A Harrier 159256/4 of VMA-231 'Det-A', June 1977

The aircraft wears the standard British colour scheme of Dark Green (BS381C: 641) and Dark Sea Grey (BS381C: 638) upper surfaces in the standard pattern with Light Aircraft Grey (BS381C: 627) under surfaces. Serial number and codes are black. Note the non-standard black rudder with white 'Spade' symbols.



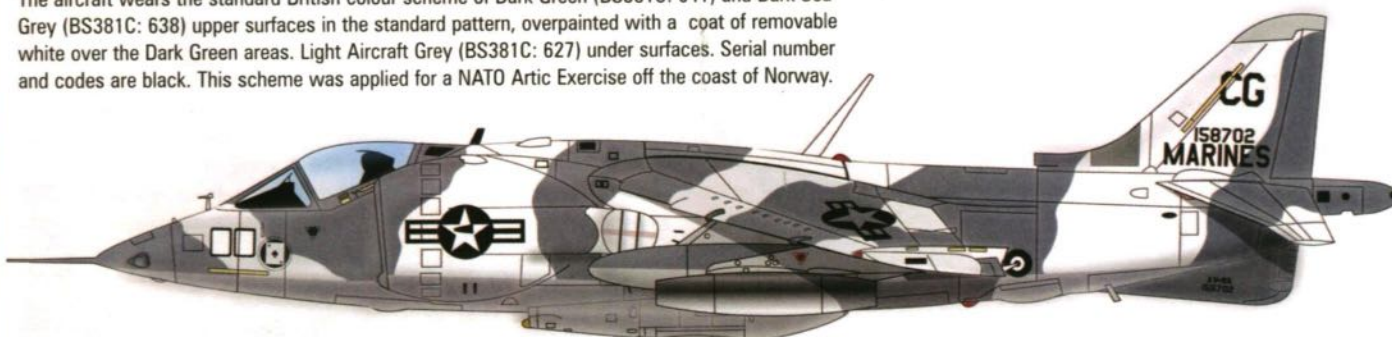
AV-8A Harrier 158701/01 of VMA-542, May 1976

The aircraft wears the standard British colour scheme of Dark Green (BS381C: 641) and Dark Sea Grey (BS381C: 638) upper surfaces in the standard pattern with Light Aircraft Grey (BS381C: 627) under surfaces. Serial number and codes are black. Note the low visibility version of the unit's familiar 'tiger-striped' tail flash.



AV-8A Harrier 158702/00 of VMA-231 late 1977

The aircraft wears the standard British colour scheme of Dark Green (BS381C: 641) and Dark Sea Grey (BS381C: 638) upper surfaces in the standard pattern, overpainted with a coat of removable white over the Dark Green areas. Light Aircraft Grey (BS381C: 627) under surfaces. Serial number and codes are black. This scheme was applied for a NATO Arctic Exercise off the coast of Norway.



AV-8A Harrier 159242/03 of VMA-231 aboard USS Roosevelt, 1976

The aircraft wears the standard British colour scheme of Dark Green (BS381C: 641) and Dark Sea Grey (BS381C: 638) upper surfaces in the standard pattern with Light Aircraft Grey (BS381C: 627) under surfaces. Serial number and codes are black. Note the black national insignia. Also note the IFR probe. The unit's familiar 'Ace of Spades' nose emblem is also missing from this aircraft.



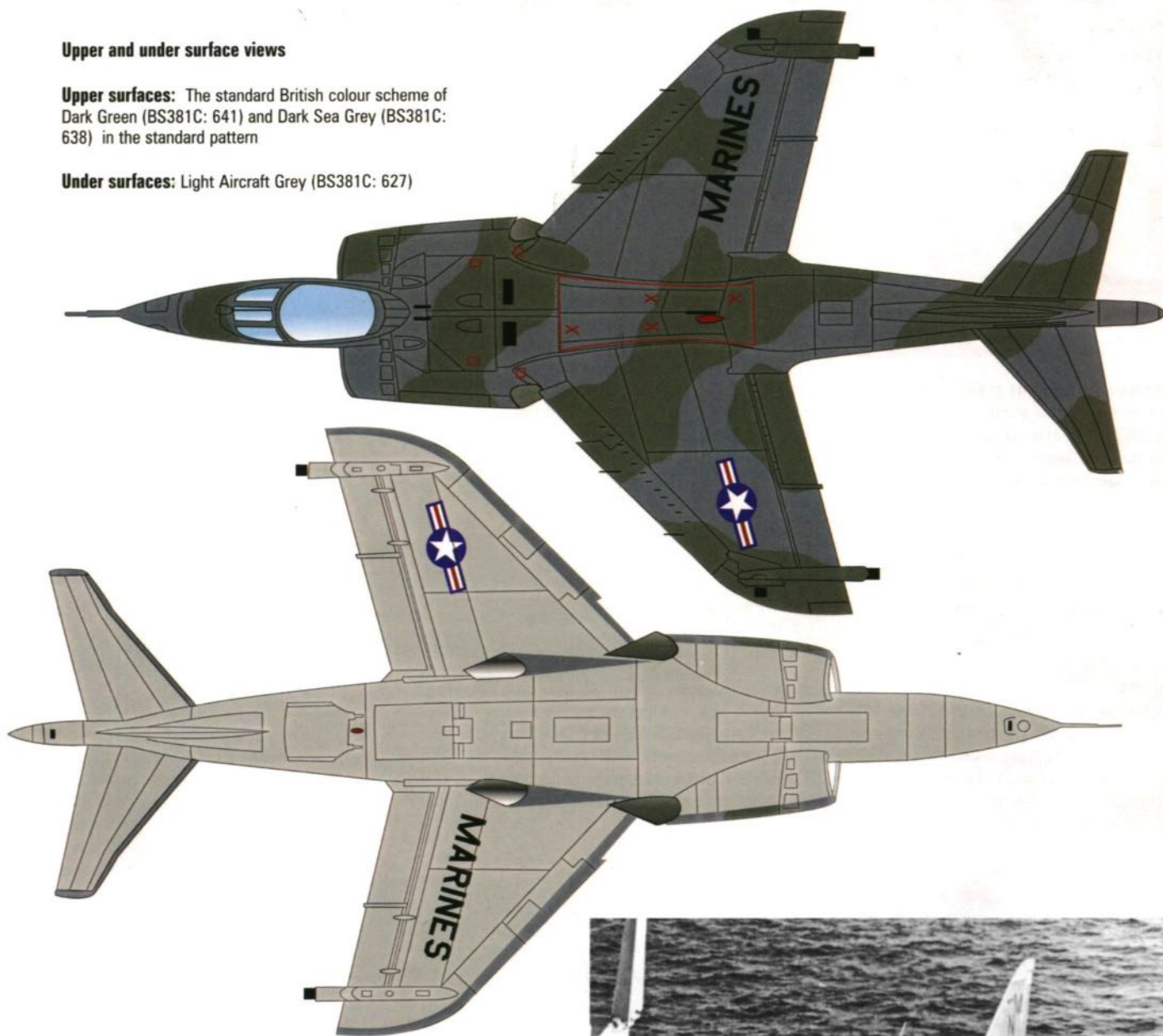
AV-8A Harrier 158954/05 of VMA-513 in 1977

The aircraft wears the standard British colour scheme of Dark Green (BS381C: 641) and Dark Sea Grey (BS381C: 638) upper surfaces in the standard pattern with Light Aircraft Grey (BS381C: 627) under surfaces. Serial number and codes are black. Note the black national insignia.

**Upper and under surface views**

Upper surfaces: The standard British colour scheme of Dark Green (BS381C: 641) and Dark Sea Grey (BS381C: 638) in the standard pattern

Under surfaces: Light Aircraft Grey (BS381C: 627)



AV-8A 159232 making a vertical recovery



AV-8A 159215 – note the practice bomb carriers

Subsequently, between 1970 and 1975, the US Marine Corps ordered some 110 single-seat and eight two-seat aircraft under the designation AV-8A, (HS Harrier Mk 50), the 'A' denoting 'Attack' and the 'V' denoting 'VSTOL'. To minimize the costs, the AV-8As were to be as near to the specifications of the British operated Harrier as possible, the main differences arising from the need to carry US weapons.

From the outset the AV-8As were wired to carry the AIM-9 Sidewinder missile on their outer wing pylons, reflecting the Corps' requirement for a secondary air-defence role. The aircraft also retained the 30mm Aden cannon and the ability to



AV-8A 159702 of VMA-231 in winter camouflage for an exercise in Norway. Note the fire-bombs (Napalm) on the wing pylons

"What had seemed at the outset to be a barely survivable novelty had turned into a first-rate fighter"



AV-8A Harrier 159252 of VMAT-203, the Harrier training unit

carry a range of offensive weapons.

The initial examples were outfitted with the standard RAF FE.541 nav/attack system, but this was replaced under the Phase 1 modification programme with a far simpler Smiths I/WAC (Interface/Weapons Aiming Computer), which undertook all the necessary aiming calculations with selectable modes such as CLIP, and displayed the information in the HUD. A further change was the original Martin-Baker Mk 9D ejection seat with the US-built Stencel SEU-3A and later with the SIII-3S, which married with the US Navy's types, and used the same style of torso harness.

In a similar manner to the Hawker Siddeley/McDonnell Douglas arrangement, Rolls Royce and Pratt and Whitney collaborated on the Harrier's Pegasus powerplant. The first ten AV-8As were fitted with the Pegasus 10 (Mk 802 export specification), which lacked an emergency fuel control. Subsequent aircraft had the uprated Pegasus 11, which under its US designation became the E402-RR-400 and was subsequently retrofitted to the first Harriers.

American standard Magnavox radios were also fitted and the Harrier gained a large angled UHF/VHF aerial on its spine, as used by the Sylvania VHF/Tac and also the provision to carry MERs, (Multiple Ejection Racks), on its wing pylons. Revised IFF gear was also installed, and the ram air turbine was eventually uninstalled from all the fleet as an unnecessary item and this simpler fit became known as the 'US Baseline'.

Following the delivery of the first AV-8A, (built by BAe Kingston and assembled at Dunsfold), by USAF C-133 transport, in 'wings off' configuration via RAF Mildenhall on 20 November 1970, BIS (Board of Inspection) acceptance trials were undertaken at Patuxent River. This aircraft was soon joined by a further three and undertook sea trials aboard USS Guadalcanal and USS Coronado.

Mid-1971 saw the 'Project Battle Cry' programme, where the Harriers underwent tactical evaluation in terms of off-base deployment, and the writing of the aircraft's tactical manual. The project encompassed weapon delivery, defensive fighter tactics, shipboard compatibility and forward basing.

Marine Harriers

Operationally the Marine Corps created three squadrons. The first to form, with an initial ten Harriers, was VMA-513 at Beaufort, North Carolina, in April 1971. By 1976 VMA-542 and VMA-231 were also up and running at Beaufort, with VMAT-203, the Harrier training establishment, also up to strength.

All the combat units undertook the regular overseas deployments to Misawa AFB, Okinawa. The key to Harrier doctrine was that of flexibility –

being able to position the aircraft close to the battle area and provide a unique form of 'manoeuvre warfare', adding close support for the troops, operating from LPH (Landing Platform Helicopter) or LHA (Landing Helicopter Assault) ships, or from swiftly established shore sites.

By 1976 the Marines had their complete single-seat Harrier force and had undertaken several deployments aboard both Marine Corps and Naval carriers. In 1975 the first six-month cruise was commenced aboard USS Guam, and in 1977 the first squadron-size deployment took place aboard the USS Franklin D Roosevelt, alongside F-4s and A-7s, where, for the first time, the Harrier was integrated into the hectic, cyclic operations of a large Carrier Air Group.



AV-8A 158961 – ideally suited to the Marines' doctrine

What had seemed at the outset to be a barely survivable novelty had turned into a first-rate fighter, and close air-support aircraft that suited the Marines' 'manoeuvre warfare' concepts completely, and the potential for further improvements led to the AV-8C, and the more powerful AV-8B. **MAM**

Next month: Part III – TAV-8A 'Harrier School'



A brace of Marines' Harriers aboard the USS Nassau

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Web Guide

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Showtime

Monthly update on aviation and related events near and far...



2009

diary

MAY

Saturday 2/Sunday 3 May 2009

Illawarra Scale Model Expo

incorporating the NSW Scale Model Competition.
Koonawarra Community Centre, Fowlers Road Dapto (South of Wollongong) NSW.
See <http://ipma.hobbyvista.com/> or contact Darren Dickerson on 0419 148 335, email ipma@gibstuff.net

Sunday 10 May 2009

The 9th IPMS Gloucester Model Show

at the Churchdown Community Centre, Parton Road, Churchdown, Gloucestershire.
10.00am to 4.30pm.
Contact Alan Firbank tel 01452 610605 email afirbank@aol.com or Jeff Brown tel 01285 659254 email gundylunch@sky.com

Sunday 10 May 2009

The Potteries Model Show

at the Meir Community and Education Centre, Pickford Place, Meir, Stoke-on-Trent.
10.00am to 4.30pm. Major Model Competition – £150 of model vouchers to be won – for the Senior Best in Show courtesy of Model Hobbies and Junior Best in Show courtesy of Affinity Models.
No other contact details supplied

Saturday 16 May 2009

Southdowns Model Show,

to be held at Lancing Parish Hall, Lancing, West Sussex. 10.00am to 4.00pm.
Competition, traders, club displays, plus refreshments.
Further details contact Paul Janicki on 01403 782638 or Craig Wells on 01273 279635

Saturday 30 May 2009

IPMS Salisbury Annual Model Show & Comp.

at Wyvern College, Church Road, Laverstock, Salisbury, SP1 1RE, UK. 0930 to 1630hrs.
Over 45 Clubs, SIGs & Traders. Free on-site parking. Details from Don Bartlett tel 01985 851113, email kateanddon@btinternet.com or visit us at www.IPMS-Salisbury.org

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IPMS
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The Royal Air Force Museum, London
Sunday 31st May, 10am - 6pm
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Free Parking. Just 10 minutes Jct 4, M1
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Radio Controlled Models
"Best in Show" Competition
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Sunday 31 May 2009

Hendon Scale Model Show

organised by IPMS Barnet and IPMS Harrow at the RAF Museum, Hendon, London 10.00am to 6.00pm. Over 30 clubs and exhibitors, Bomber Command museum and the Milestones of Flight Hall, plus 20 traders located. There will be films, displays by Friends of the RAF Museum, and veterans signing books. Free admission and parking.
For more info contact hendonmodelshow@yahoo.co.uk

JUNE

Saturday 6 June 2009

The Heart of Scotland Airshow

at Perth Scone Airfield. The Red Arrows will fly at the airshow and lots more to come too! We anticipate a crowd of 10,000 with parking on site! Trade Stalls welcome.
Go to <http://www.perthairshow.com> and click on TRADERS INFORMATION or download our pdf file from www.perthairshow.com/index.php?option=com_content&view=article&id=14&Itemid=18
Contact Gill Howie Tel: 01241 437555
Mobile: 07977 151895
gill.squadronprints@mac.com

Tuesday 30 June 2009

'Ground Attack' – a talk by Group

Captain Tom Eeles

at the Holy Trinity Community Centre, Boundary Road, Newark, NG24 4AU, (Tel: 01636 707170)
The first 'Newark Air Museum Talk' of 2009 will feature the Buccaneer and the guest speaker will be Group Captain Tom Eeles whose talk will cover his experience converting to and operating the Buccaneer S.2 with the Royal Navy, with a detailed description of embarked flying from HMS Victorious. The talk will feature video, taken on board, of launch, weapon delivery and arrested recovery.
Ticket price: £5.00 - available from The Museum Shop. Bar Opens: 1900 hrs - Lecture starts: 2000 hrs. Newark Air Museum Ltd, Winthorpe Showground, Newark, Notts, NG24 2NY - Telephone - 01636 707170
www.newarkairmuseum.org

Sunday 28 June 2009

IPMS Coventry & Warwickshire Model Show

in association with Midland Air Museum, Coventry. 10.00am to 4.00pm.
Entrance fee includes Museum entrance fee.

Contact details: Museum on 024 7630 1033 or Stephen on 01675 481687

AUGUST

Sunday 23 August 2009

Avon IPMS 20th Model Show,

to be held at the yate Leisure Centre, Kennedy Way, South Gloucestershire. 10.00am to 5.00pm.
Open Competition; club displays; trade stands; free parking; refreshments available.
Contact details: General enquiries Mike Lumb on 0117 931 5600 evenings; Clubs and Traders email Kevin Webb hippo58@blueyonder.co.uk

SEPTEMBER

Saturday 5 September 2009

IPMS West Cornwall Annual Model Show

to be held at St John's Hall, Alverton Street, Penzance, Cornwall TR18 2QR. Opening times are 10.00am - 16.30pm. Admission: Adults £1.50, Children £1. Contact Arthur Johnson (Club Secretary) on Tel 01736 757726 or email us at ipmswestcornwall@hotmail.co.uk

OCTOBER

Sunday 4 October 2009

East Anglian Model Show,

organised by IPMS Ipswich to be held at Ipswich Town Football Club, Portman Road, Ipswich – sponsored by SBX Model Shop and Ipswich Town. 10.00am to 4.00pm.
Featuring the East Anglian Model Competition, many clubs, SIGs & traders, plus refreshments and bar.
Adults: £3.00; Children & OAPs £1.50; accompanied children under 12 free.
Further details from Kelvin English tel 01473 657744/07921 681303, email kelvin.english@virgin.net

Sunday 11 October 2009.

Expo 2009

organised by IPMS Lincoln and IPMS Newark, to be held at The Grandstand, Southwell Racecourse, Southwell, Notts. 10.00am to 4.00pm.
30+ class competition; club displays; wide range of traders; on-site catering; bar; free parking and FREE admission.
For further details – Clubs and competition: Ian Crawford, 01522 804661 email expo@lincolnmodelclub.co.uk; traders: Steve hesse 01522 541146

EXPO 2009
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Newark Model Club
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Open for members @ 8:30am • Open to the public @ 9am • Registration from 9am to 10:30am
Judging begins @ 12:00pm • Awards presentation @ 4:00pm • Hall must be vacated by 5pm

SOUTHERN AFRICAN TOP GUNS

Friday 16 & Saturday 17 October

JERSEYCON – IPMS USA Region 2

Convention

Presented by New Jersey IPMS at the Holiday Inn in Runnemede, New Jersey. Theme: 'To the Nines – 1939-2009'. Model competition, lectures, symposiums, raffles and the best hobby vendors on the east coast. Contact Big Bill Schwarz on 732-567-3724 (no calls after 9pm) or email tomcatter53@optimum.net. Keep watching our website www.njipms.org for updates, including on-line features for registration forms and news.

NOVEMBER

THE BIG ONE!

Saturday 7/Sunday 8 November 2009

IPMS(UK) Scale Modelworld 2009 – THE modelling event of the year!
incorporating the IPMS(UK) Annual Model Competition
Three large halls; over 100 traders; over 100 Branch and SIG displays
Further details nearer the date

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Presented by The International Plastic Modellers Society (IPMS)
7th & 8th November 2009
Saturday 7: 10am - 5pm, Sunday 8: 10am - 4pm
Entrance Prices
Adult: One Day £14, Two Day £24
Concession: One Day £9, Two Day £14
Child: £4 per day, Groups: £18 per day
International Centre
Salford, Greater Manchester M6 6PU

Forum

Alpha Jet schemes

Dear Neil,

I read the February 2009 issue of the magazine and especially your Editorial sounds so familiar to me. I knew why I liked you. We are twins in our thoughts. I hope you don't misunderstand me, this is not a love song. I only would like to say, with my limited English, that I enjoy it every time to be in touch with you. You are a real good friend.

This issue of 'MAM' was one of the best I ever had read. The Mosquito Manual article was simply superb – I can't wait to read Part Two that will follow. Please forward Dave Brown my deepest respect for his

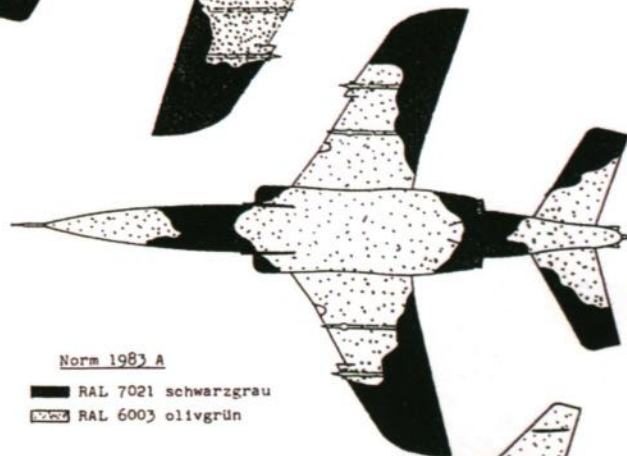
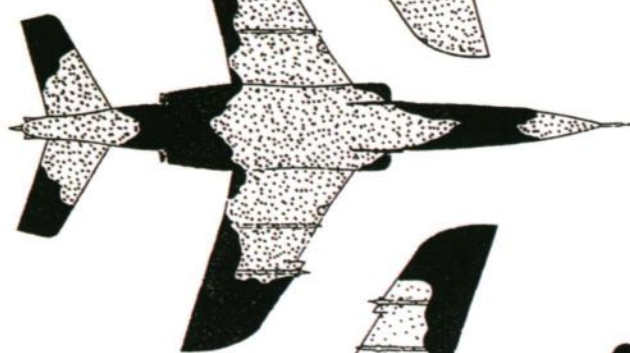
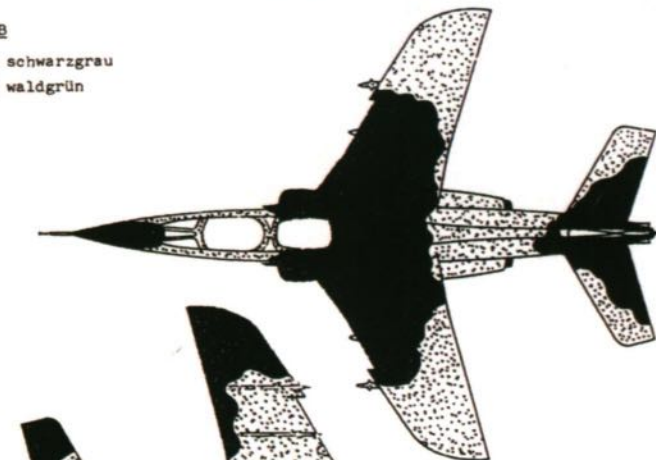
research and modelling skills.

The British Alpha Jet article was interesting to me – especially as these are former Luftwaffe birds...

Attached you will find original Luftwaffe orders for the painting of the Luftwaffe Alpha Jets. You will see that two different camouflage patterns existed and that also different colours were used
Michael Ullmann,
 Oberteuringen
 Germany
 via e-mail

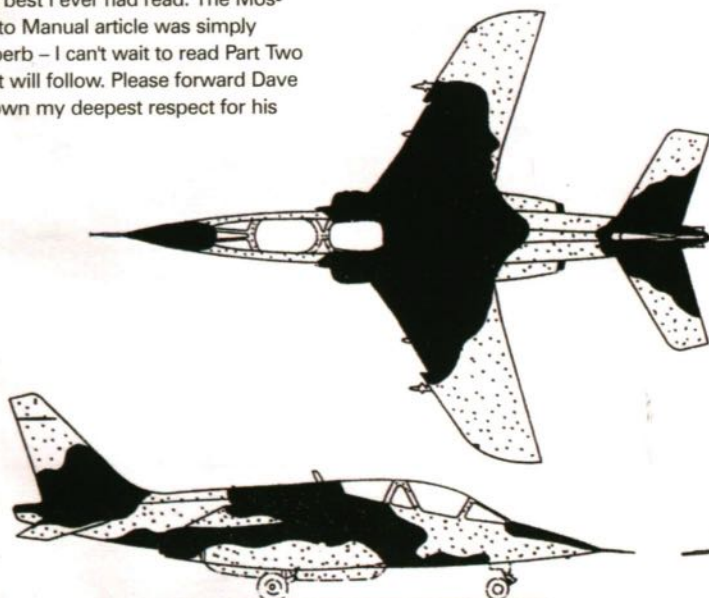
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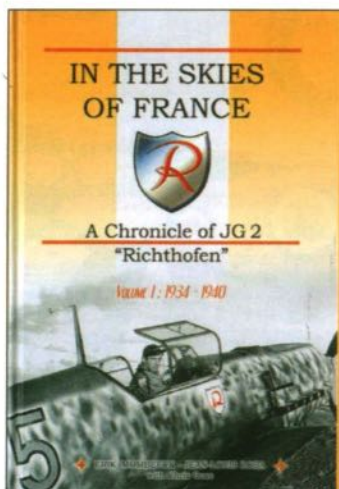
'In the skies of France

a chronicle of JG 2 'Richthofen' - Volume 1'

Histories of World War Two units, especially Luftwaffe units, always attract my fascination, and this one, by a well-respected trio of 'Experten' in their own right, is extra special! It features literally hundreds of b&w photos taken at the time, and nearly all of them published here for the first time!

Starting with the origins of the unit, from the end of World War One through the various JG 132 and subsequent temporary redesignations, which covers a variety of Heinkel He 51, Arado Ar 68 and even a Staffel of Heinkel He 100s, the book describes in words and, just as importantly, scores of wonderful photos, the creation and development of this famous unit.

The story continues with the unit's involvement in the invasion of Poland in September 1939, getting to know their new Bf 109Es through the so called 'Phoney War' (Sitzkrieg) on the Franco-German-Belgian frontier, into the invasion of France and on to the Battle of Britain from June all the way through to November 1940 and up to the loss of the Geschwader's popular Kommodore, 54 'kill' ace,



by Erik Mombeeck and Jean-Louis Roba with Chris Goss
published by ASBL
UK price £49.99
ISBN 978-2-930546-00-1
305 x 220mm
Hardback 316pp

Major Helmut Wick.

The photos of the aircraft alone could keep a modeller going for years, but the unit's personalities are also well covered, with the likes of 'names' such as Erich Mix, Hans Hahn and Werner Machold.

There are eight pages of full colour artwork profiles at the rear, superbly rendered by Tom Tullis and Thierry Dekker, illustrating some of the unit's aircraft, including the 'development' of the camouflage scheme and markings changes applied to Helmut Wick's mounts.

At virtually £50.00, (current UK price), it's not a cheap book by any means, but it is the result of years of painstaking research, and is a reference par excellence.

Judging by the book cover title, this is the first of what is planned to be a multi-volume treatise of an exceptionally good in-depth study of Jagdgeschwader 2, and if you have any interest at all in wartime Luftwaffe aircraft, or their units, I seriously suggest investing in this excellent book...

Neil Robinson

Thanks to Simon Watson, The Aviation Bookshop, for the review copy



9th Air Force

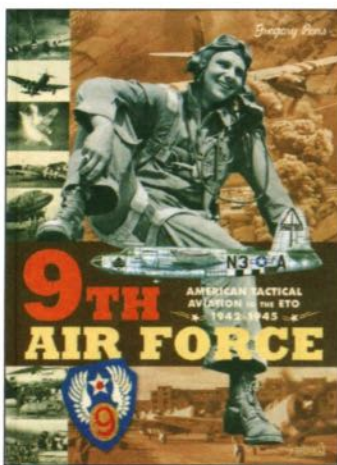
American Tactical Aviation in the ETO, 1942-45

Histoire & Collections have got a good reputation for producing some interesting books and this one maintains that reputation, although it is a little 'different' in presentation to that which we may have become accustomed from them.

A hardback of some 196 pages, the text, in English throughout, chronicles the development of USAAF tactical aviation support units, first in the North African/Tunisian/Sicilian/Italian Theatres and then in the Northern Europe Theatre and the 'rebirth' of the 9th Air Force in the UK for the planned D-Day operations.

This is very much personnel-orientated publication, with personal anecdotes and sections of text by individuals who participated, from air and ground crew to the ground support units.

Many of the 9th AF units are featured including the 12th, 344th,



by Gregory Pons
published by Histoire & Collections
UK price £42.00
ISBN 978-2-35250-077-3
316 x 235mm
Hardback 196pp

386th, 394th and 410th BGs, the 36th, 362nd and 405th FGs, the

440th TCG, 425th NFS, and the 926th Engineer Aviation Regiment (with their bulldozers!) illustrated by scores of archive photos of men and machines.

Interspersed amongst the text and photos are well executed, airbrush artwork profiles, of all the major operational aircraft types, plus rather quaintly, full pages of 're-enactment' individuals dressed up in the various uniforms and flying equipment used during the period.

Some of the photos are reproduced 'huge' - across a double-page spread - but all seem to be good clear images, and many of the ones of aircraft feature nose art.

Perhaps not a 'history' as we have come to expect from the likes of the '2 TAF' series by Ian Allan, but if it's archive photos of the 9th AF and its aircraft you're after, then you have got a 'bucket-load' of them between the covers of this book, and therefore it can be rec-



ommended, to aviation enthusiasts and aircraft modellers alike!

Neil Robinson

Thanks to Chris Lloyd (Sales and Marketing) for the review copy

Wings on Windermere

The history of the Lake District's forgotten Flying Boat factory

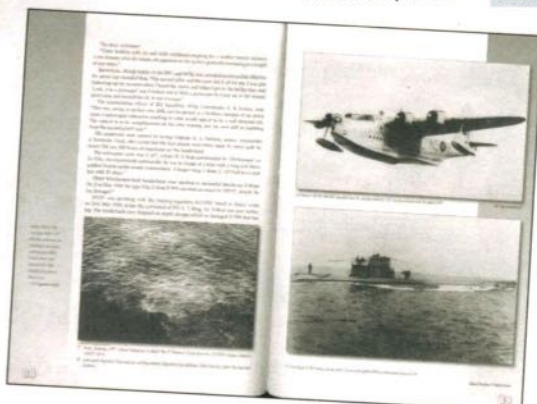
This book is a bit of a departure from normal Mushroom Model Publications' fare, and rather than dealing with an aircraft type as such covers the little-known, (or in my case 'not known at all'), history of the Short Sunderland production facility at the 'dispersal scheme', White Cross Bay site on Lake Windermere during World War Two.

Quite apart from a fascinating read, which offers an insight into how the dispersal of aircraft production was managed during the war years, there are scores of archive photos of the site and the

product, the mighty Short Sunderland, that was produced there.

The actual aircraft were Mk IIIs, in the DP and EJ serial number ranges, and there are full, individual aircraft histories of all the thirty-five or so completed

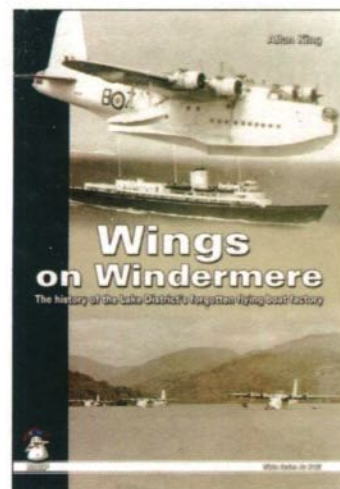
by Allan King
published by Mushroom Model Publications
UK price £24.99
ISBN 978-8-3389450-82-1
297 x 210mm
Softback 160pp



at the White Cross Bay complex, from September 1942 to August 1944.

There are many photos of the White Cross Bay, Windermere-built aircraft in wartime operational and post-war service, which operated worldwide, and there are 7pp of full colour camouflage and markings profiles.

Well worth checking out, for historical aviation refer-



ence, or if you plan to build a Windermere-built Sunderland...

Neil Robinson

Thanks to Chris Lloyd (Sales and Marketing) for the review copy

Scimitar – Supermarine's last fighter

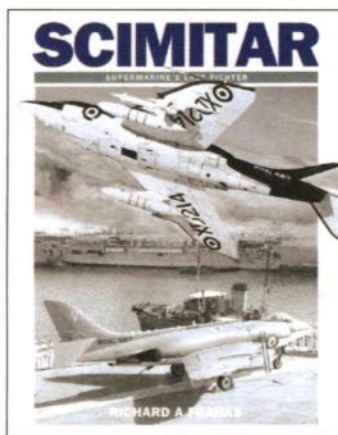
As far as I am aware, there hasn't been all that much written about the Scimitar; the only other book that immediately springs to mind being the combined coverage in the Ian Allan Postwar Military Aircraft: 7 series book, on the Attacker, Swift and Scimitar by Philip Birtles in 1992, so this latest publication from the D&V team is most welcome.

Despite its relatively short service life and limited production run, the Scimitar was nonetheless an important Fleet Air Arm asset in the late 1950s and early 1960s, together with the Sea Vixen, before the introduction of the Buccaneer and Phantom.

Happily, Richard Franks has done an excellent job in covering 'Supermarine's last fighter' and has provided an interesting and informative text with scores of well reproduced photos – of which a 12pp section in the centre are in full colour.

The various chapters deal with the development and subsequent service career of the type, technical description and data with several pages of manual drawings; Scimitar colours and markings – including 13pp of profile and 4-views by the excellent Richard Caruana; a photo section of the Scimitar in detail with dozens of close-up shots; Scimitar squadrons, and a full production list by serial number of all Scimitars built.

Kits of the Scimitar are few – the 1/72 Czech Master Resin being the



by Richard A Franks
published by Dalrymple & Verdun
UK price £19.95
ISBN 978-1-90541-410-9
280 x 215mm
Softback 120pp

only one currently available I believe, (although there were 1/48 vacforms by Dynavector and Sanger and a 1/144 one by Welsh Models) – so perhaps the time is right for a mainstream manufacturer to have a go?

In the meantime, it's good to see that this very British publisher is covering the 'home grown produce' so well, and long may they continue...

Recommended to all those with a pride in our aviation heritage.

Neil Robinson

Thanks to Dalrymple & Verdun for the review copy



Junkers Ju 287

At first glance you might think this is an awfully large book to dedicate to an aircraft type of which only three were built, but once you open it you will find that it is more than a monograph but the history of forward-swept-wing development.

The book picks up the story in 1857 with a patent applied for by Felix du Temple. The drawings proposed a strange looking machine that would have been propelled with an electric motor. The first section of the book illustrates many more early attempts at this configuration and from 1911 actual aircraft were built and flown by both the Germans and Russians.

By the Second World War things got a little more serious, with Junkers entering the fray, which eventually culminated in the design that we are all familiar with.

As this was primarily a test-bed, Junkers did not waste resources in building a completely new aircraft but used available components within the structure. For instance 'V1' used the nose and forward fuselage of an He 177A-3, the rear fuselage of a Ju 188/388, the fin and rudder from a Ju 388L and, amazingly, the undercarriage from a B-24 Liberator!

Similar components were used on the 'V2' but with the 'V3', the completion of which was done in the Soviet Union under the designation EF 131, it had a 'conventional' undercarriage and a cockpit similar to the Ju 388.

The book is profusely illustrated with b&w photographs of the construction of these aircraft, a large number of close-up shots and some excellent scale drawings by Arthur Bentley and Gunter Sengfelder, which



by Stephen Ransom & Peter Korrell
published by Ian Allan
UK price £30.00
ISBN 978 1 90322 392 5
310 x 230mm
Hardback 160pp

are supplemented with some 'manual' drawings.

There are only three pages of artwork, which is logical because it seems that the only legible photographs of the German aircraft are of the 'V1', which only carried one scheme.

This is an excellent reference and I cannot see any future book giving us any better information. I can recommend this book to both enthusiast and modeller, and one that might entice you to wade through your stock to find the Huma kit you never built...

James Reaney

Thanks to Ian Allan Publishing for the review copy

American Aerospace Archive 1 Martin JRM Mars Flying Boat

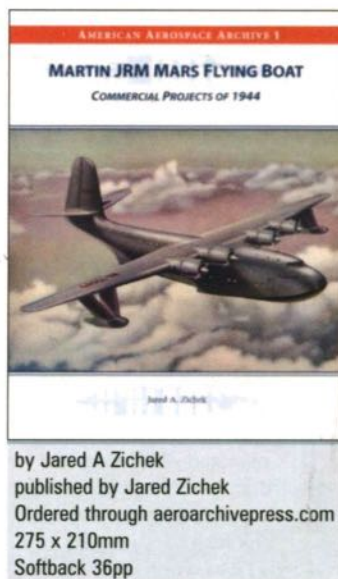
This is an unusual publication. It is actually a reproduction of a promotional brochure, entitled 'Martin JRM Mars: Commercial Projects of 1944'.

The illustrations cover both passenger and cargo variants. Although the passenger version was not proceeded with the cargo machine has been in service as a water bomber until recently!

The first section gives us artists' impressions on what could be achieved in the way of passenger accommodation. Being an extremely commodious aircraft this could be luxurious, very similar to the projected interior of special versions of the Airbus A310. But what really interests me was the novel way that the cargo was to be loaded and stowed in the transport version.

There was a huge hatch in the fuselage under the wing and heavy items could be loaded by means of a 5,000lb crane travelling along tracks on the lower surface of the wing, with smaller items dealt with using a conveyor through a smaller hatch.

However the most intriguing device was the cargo hold inside the wings. The wings are extremely thick, allowing a man to walk upright in the inboard area. There was a panel in the wing, which could be lowered, loaded with cargo and hoisted back,



by Jared A Zichek
published by Jared Zichek
Ordered through aeroarchivepress.com
275 x 210mm
Softback 36pp

to be positioned by the crewman.

Much of this use was speculation, I am afraid, as by this time airlines were moving away from the idea of seaplanes and onto land-based aircraft, more densely packed for less well-off passengers.

Still, the reader has a glimpse of what might have been, although I doubt if many of us could afford the fare...

James Reaney

Thanks to Jared Zichek for the review copy

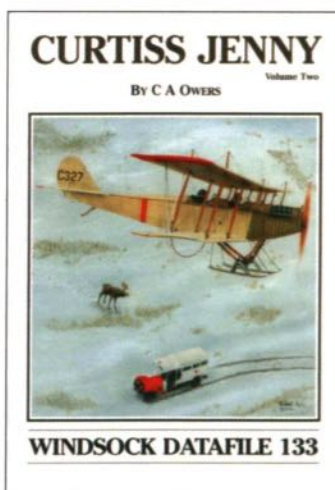
Windsock Datafile 133 Curtiss Jenny – Vol 2

This second volume covers the Canadian-built aircraft that were used by the RNAS and Australians, as well as by the Canadians themselves. The text chronicles the history and development of the Canadian-built machines with the usual complement of photographs.

The modeller will appreciate some of the detail shots. For instance there is a very large one showing the installation of a vertical camera and the crude way it was attached – just on to two strips of wood bolted to the fuselage side! Another photograph shows a similar wooden frame, this time holding a Vickers machine gun.

The 1/72 and 1/48 scale drawings are of the Curtiss JN-4(Can) as are the aircraft covered in the artwork. In this case, both the inside and outside of the rear cover are used. This is necessary because two of the four aircraft are shown in both plan and side view.

It seems that very rarely did the Canadian-based aircraft carry national insignia and many were presentation machines. But unlike other nations that usually had a small inscription, the sponsor was blazoned along the



by Colin A Owers
Albatros productions
UK price £10.85
ISBN 1-902207-99-8
290 x 200mm
Softback 36pp plus covers

side of the fuselage.

Need I say this monograph is welcome? I would not dream of starting a kit of this period without checking my Windsock Datafile list first.

James Reaney

Thanks to Albatros Productions for the review copy

Arado Ar 96 - colour & markings

This is the second book in this series aimed at the modeller. It comes with a set of decals for twelve aircraft and in reality the book is basically a deluxe instruction sheet.

Each subject is treated to a full page four-view to assist with decal placement, with the opposing pages featuring photographs of that particular aircraft. The remaining three pages contain close-up shots of the interior and undercarriage.

The decals include a wide variety of schemes, which cover aircraft of the Luftwaffe, Bulgarian, Slovak, Hungarian and Czechoslovakian Air

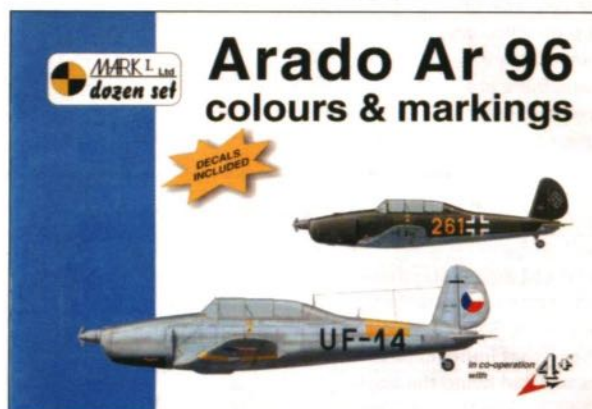
Forces, plus the RAF – all in all a new and unique way to combine decals and reference.

Please note that this book can be purchased with either 1/72 or 1/48 scale decal sheets.

James Reaney

Thanks to Mark 1 Ltd for the review copy

by Michal Ovcacik & Karel Stepanek
Mark 1 Ltd
UK price £17.99
ISBN 978-8086637-10-5
210 x 295mm
Softback 28pp



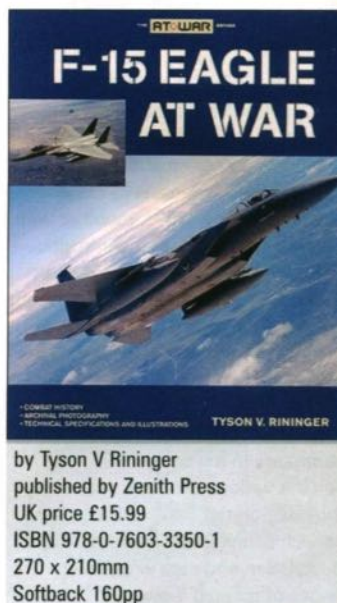
F-15 Eagle at War

The title '... at War' is a little misleading because it also chronicles the concept and development of the aircraft. The F-15 first took to the skies in 1972 and has been on the American inventory for over 35 years. As with many warplanes the F-15 was created out of necessity, mainly in response to advances in aircraft design by the Soviet Union.

One of the problems was that many American aircraft were designed to fight at a distance, using missiles, but as it turned out in the Vietnam War, much of the combat was done at close quarters where the missile was not effective and, as you did not have a gun and the enemy did, things could get a little tricky.

Chapter one covers all these problems and how it came about that new types of aircraft were needed. The following chapter covers the development of the F-15 and then we proceed to its war service, although some of it is 'cold' rather than 'hot' war. The book continues with a chapter covering the F-15E Strike Eagle, followed by the weapon loads and finally a discussion on its successor.

As with all the books in this series there are plenty of photographs, all in colour, and these are supplemented with some colour profiles of ordnance



by Tyson V Rininger
published by Zenith Press
UK price £15.99
ISBN 978-0-7603-3350-1
270 x 210mm
Softback 160pp

– something that will be of use to the modeller.

I would consider this an ideal present for the budding aviation enthusiast, although I must add that this is very much a US Air Force-orientated book, with little or no mention of export aircraft, many of which have seen more action than their American counterparts.

James Reaney

Thanks to Zenith Press for the review copy

04728 Junkers Ju 88 A-1 "Battle of Britain"

04297 1:48 B-17F "Memphis Belle"

04555 1:48 Mosquito Mk.IV

04300 1:72 Avro Lancaster Mk.I/III

All-round Hunter

1:32 Junkers Ju 88 A-1

04278

This four-seater multi-role bomber was produced throughout the Second World War. Designed by Hugo Junkers in the mid 1930s, but not seeing full service until late 1939, it was one of the most versatile combat aircraft in the German armoury.

Its speed, robustness and excellent maneuverability made the Ju 88 one of the most feared aircraft of the German Airforce. And, like a number of other Luftwaffe bombers, it was used successfully as a bomber, dive bomber, night fighter, torpedo bomber, reconnaissance aircraft, heavy fighter, and even as a flying warhead during the closing stages of conflict. There were 15,000 Ju 88's built during World War II, more than any other twin-engined German

aircraft of the period. Despite its protracted development, the aircraft became one of the Luftwaffe's most crucial assets.

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